FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

More Ice Cream Allocations

THE ice cream industry is gradually getting back into its stride. The allocation of cornflour has been fixed by the Ministry of Food at 60 per cent. of the datum usage, and the allocation of chocolate couverture at 40 per cent. There is, however, a temporary hold-up in the supply of dried whole egg to a number of food manufacturing industries, including ice cream. It is now officially announced that gelatine may be used in ice cream manufacture but not in ice cream powders (in which gum tragacanth is more suitable). But supplies of gelatine are short and 5 cwt. per quarter is the largest quantity that any manufacturer will be able to buy. Licences will not be granted for larger quantities. Large manufacturers will therefore be obliged to rely on other stabilisers for at least a portion of their requirements. Locust bean gum, of which the Ministry of Supply has about 66 tons, is recommended as an alternative to gum tragacanth. Application for samples of locust bean gum should be made to the Ministry of Supply, Sundry Materials Dept., 8-10, Old Jewry, London, E.C. 2. This gum comes from Cyprus and the price will be about the same as that of gum tragacanth.

Supplies of paper and paper board are such that these packaging materials can only be allocated to wholesale ice cream manufacturers. These firms, of whom there are some 300 in Great Britain, will be required to market at least 10 per cent. of their output in bulk in metal containers. The remaining 90 per cent. will be marketed either (*a*) in paper wrappers or tubs; or (*b*) in bricks of 1 pint capacity or over. The bulk of the output will be in 1-pint bricks. The Paper Control will issue a single licence to the Ice Cream Alliance covering all wholesalers other than those of the Wholesale Ice Cream Federation. This licence will cover a total of 400 tons of paper and board annually, and will show the quantity of paper to which every wholesaler will be entitled under (*a*) and (*b*) respectively. These quantities will not be interchangeable. In regard to tubs, it is estimated that 1,000 tubs of 8 oz. capacity, with lids, will require 20 lb. of paper; and 1,000 of 2 oz.

capacity, with lids, will take 15-16 lb. of paper. Boxes for packaging pint blocks will be made of white lined chip board and will be available in two shapes. One, with a cross section the size of a standard wafer biscuit, will require 1 cwt. of board per 10,000 boxes; the other, of less convenient shape, is more economical in the use of board, 10,000 boxes requiring only $\frac{3}{4}$ cwt. of board. Eight hundred boxes will, of course, be required to package 800 bricks of either shape.

The paper allocations are being calculated on a formula worked out by the Ministry of Food. This gives wholesale manufacturers $\frac{1}{3}$ cwt. of paper and paper board combined, per 100 gallons of finished ice cream. Many wholesalers are also retailers: in such cases the allocation is calculated only on the wholesale trade.

Since the foregoing was written the Ministry of Food has announced that supplies of fat and milk powder for ice cream are to be made available to all makers who already have an allocation of sugar for ice cream making. The fat will be unsalted cake margarine. The milk powder will be roller processed skimmed milk powder. Forms of application are now being despatched to all those traders concerned who have not previously had supplies of fat and milk powder for this purpose. The new permits will be issued by the Ministry's oils and fats distribution officers, and if the necessary arrangements can be completed in time, the permits will be issued during March and will relate to the rationing period beginning on April 1.

Unsalted cake margarine and roller processed skimmed milk powder are not available from retailers, and ice cream makers will get their supplies from a wholesaler. If they are unable to find a wholesaler to supply them, the oils and fats distribution officer, whose address can be had from the local food office, will give them a list of suppliers. There will be no change in the present arrangements by which ice cream makers get their supplies of sugar.

FOOD MANUFACTURE learns that the plan outlined in the February issue for making fat and skimmed milk powder available in the form of synthetic milk will not be compulsory, though that was the original intention. Ice cream makers may process these ingredients themselves or make arrangements to have them reconstituted by a firm that possesses the necessary emulsifier.

Milk for Manufacture

Addressing the Society of Dairy Technology in London, Mr. T. Peacock, a member of the Milk Marketing Board and of the Council of Agriculture for England and an ex-President of the National Farmers' Union, quoted the following figures of sales of milk through the Milk Marketing Board since the outbreak of war. They show how supplies available for manufacture have decreased as the liquid market has increased:

SALES IN ENGLAND AND WALES
(Million Gallons)

Oct./Sep.	*Liquid.*	*Mnfre.*	*Total.*
1938-39	766·82	351·88	1,118·70
1939-40	788·75	281·97	1,070·72
1940-41	926·34	118·58	1,044·92
1941-42	971·49	107·69	1,079·18
1942-43	1,017·19	127·83	1,145·02
1943-44	1,048·53	132·50	1,181·03

He also revealed that, comparing 1943-44 with 1938-39, production of winter milk had increased by 40,000,000 gallons (nearly 7,000,000 a month), but the increase in summer was only 22,000,000 gallons (approximately 3,500,000 gallons a month).

Dr. N. Stuart, dealing with the type of milk suitable for condensing into evaporated milk and sweetened condensed milk, said that the manufacture of these products required much technical skill. The quality of the original milk was most important if a marketable product were to be made, and a manufacturer ignoring this point was bound to suffer losses due to spoilage. Since both condensed and evaporated milk were exported from this country in large amounts and were expected to carry a high reputation under the worst tropical conditions, the manufacturer could not afford to take risks either with his internal factory efficiency or with the milk he was using. The factors most objected to by manufacturers were those which lowered the heat-coagulation point of the milk in processing, this applying particularly to evaporated milk. The abnormalities in the milk might be a disturbed mineral salt or protein balance, or might be due to bacterial action. Condensed milk manufacturers were obliged to apply several tests by which to avoid, as far as possible, factors beyond their control. Different manufacturers favoured different methods of attaining the same result.

The feeding of infants, he said, was one of the most important purposes of roller process milk powders. That fact alone was sufficient to emphasise the importance of the quality of the milk and the standard of the factory conditions. The original milk must be freshly produced under the best conditions so as to avoid any changes in it due to bacterial action before drying and to avoid variations in the flavour of the final powder.

Milk giving a bad resazurin test was not wanted by the manufacturer, he added. On the other hand, milk giving an excellent resazurin test could not always be regarded as satisfactory for manufacture either, since this test did little to detect faults that could give rise to many of the defects in manufactured products. Milk for manufacture could not be selected by a single test.

The Man for the Job

The Ministry of Labour's proposals for filling all post-war positions of the "under fifties" through the Appointments Department have received considerable criticism, and there are already signs of some modification of these proposals. It may well be asked what Ministry of Labour and National Service interviewers earning £10 per week can know of the suitability of an applicant for employment in a post carrying £2,000 a year. However, the Ministry could, even in the post-war years, act as a useful clearing-house for employment, collecting and submitting the names and qualifications of people on its register, leaving the employer to decide whom he will appoint.

Large numbers of disabled men suffering variously from physical or mental disablement, and upon whom a very large amount of money has been spent on rehabilitation, have to be dealt with. Are the rehabilitation officers within the Ministry of Labour and National Service really competent to advise upon the placing of these men in industry? Do they know enough of local conditions and processes to ensure that they will place them where there is a reasonable chance that the men will be integrated into suitable employment without friction and frustration? Are these officers, in their own sphere, of sufficiently high experience and knowledge to act—as they will have to act—in a manner complementary to the highly skilled medical men and physio- and occupational therapists, who have probably had the men under their care for many months?

It is of considerable importance that Ministry of Labour and National Service officers, whether in the Appointments Department and Central Register, both dealing with appointments of the higher standard, or in the employment exchanges dealing with posts of the lower standard, possess the experience and competence to enable them to assess the necessary qualifications for employment in relation to specific jobs.

The employer must obviously have the final choice, and this, we believe, is fully recognised by the Ministry of Labour and National Service.

Wages Councils Bill

A number of food industries will be affected by the Wages Councils Bill, which passed through the House of Commons with surprising rapidity. The committee stage occupied only four hours, and the report stage and third reading took less than one hour. The Bill provides for the regulation of the remuneration and the conditions of employment of some 15,000,000 workers, and contains three main proposals:

(1) To re-enact the Trade Board Acts, 1908 and 1918, and in so doing to bring the powers of Trade Boards, which will be renamed "Wages Councils," into line with those of analogous bodies established under later legislation;

(2) To provide additional powers whereby a Wages Council can be established, subject to a recommendation by an independent commission of inquiry where the commission is of opinion that voluntary machinery is not adequate or is likely to become inadequate and, as a result, a reasonable standard of remuneration is not or will not be maintained; and

(3) To continue, with minor modifications, the provisions of Part III of the Conditions of Employment and National Arbitration Order, 1940, for a period of five years from the day on which that part ceases to have effect. This will continue the obligation on employers to observe terms and conditions of employment not less favourable than the recognised terms and conditions in the trade or industry in the district. The obligation will not apply, however, in relation to any worker in respect of his employment during which his remuneration is fixed by statutory wage-fixing machinery.

The underlying principles of the Trade Board Acts remain and many of the provisions are not substantially changed. The main alteration is in Part II of the Bill, which introduces a new principle in legislation of this kind. Mr. Ernest Bevin, moving the second reading of the Bill, recalled the difficulties experienced in industrial negotiations from 1918 to 1926 because of the rapid inflation and the terrible deflation during that period. "By preventing the temptation to imagine that we can get quick, unmeasured and violent changes in the wage system we shall provide a great brake and will force economic considerations upon those who handle finances and industry at the critical moment of the transition from war to peace," he added. By that means stability should be provided.

The third proposal, he said, was intended to prevent strikes breaking out in the immediate post-war period, particularly among non-federated firms.

Synthesis of Vitamins in the Bowel

The first suggestion that a vitamin can be synthesised by micro-organisms in the bowel of cattle came in 1916, and such synthesis was experimentally demonstrated in 1926. Considerable bacterial synthesis of various B vitamins, as well as protein from inorganic nitrogen, has since been demonstrated in ruminant animals. The *Lancet* (December 30, 1944), in an article on the subject, describes more recent work, which "it seems justifiable to expect will revolutionise our outlook on vitamins and vitamin-deficiency syndromes. They can, for instance, suggest answers for the old questions, why people on diets low in some vitamins remain healthy; why agreement cannot be reached on the human requirements of B vitamins; why studies on the effect of B vitamins on various body functions

have produced such contradictory evidence; why maize, which is the staple food of pellagra districts, is not particularly deficient in nicotinic acid, while milk, which contains negligible quantities of this vitamin, has pellagra-curative effects."

The original paper must be read for details of the brilliant methods employed in these researches, but in the words of the writer of the article: "The main conclusion to be drawn from the evidence available is that the accepted definition of a vitamin as an exogenous cell catalyst which must be provided by the diet, since it cannot be produced by the body, has broken down, because under certain conditions B vitamins can be synthesised in the bowel by the micro-organisms which inhabit it. Moreover, the intestinal microflora will have to be regarded as a major part of what is tellingly termed 'the constitution of the individual.'"

Eyelid Retort Doors

Canning executives are familiar with the tedious handling of retort doors which either open inward, aided by a counter-weight action, or swing outward on hinges and require hand labour to secure them in such a way as to make a steamtight door seal. A new-style cannery retort door, built by a Vancouver, B.C., firm, is described by S. H. Cooke in the *Canner* (December 2, 1944). The most striking feature of the door is the "eyelid" principle that is used in opening and closing it.

The head of the new retort presents a ball-like appearance. To open or close the door the retort operator moves the handle of a control valve, admitting compressed air or steam into the required end of an operating cylinder. He then turns the hand-wheel at the front of the retort and the door moves. During power operation the steam or air, acting on a piston, does the work of opening or closing the door, but the non-reversing action of worm and worm-wheel, operated by the hand-wheel, keeps the door under the continuous and positive control of the operator. The door is not flat, but convex. In opening it rolls upwards and inwards into the top of the heat in what is best termed an "eyelid" action. In the final operation of closing, the door is forced forward, its rim being pressed against packing in the head of the retort. This gives the initial seal and, as pressure builds up into the retort, the door is pressed even more tightly against the packing and the resulting seal is effective.

Time-saving is effected in two ways: first, by the speed of operation of the door, and, second, by the quick build-up of pressure due to the positive seal. The faster operation also permits the retorts to be loaded before they become too cold, adding to the fuel economy resulting from the more steamtight action of the door.

Since the door opens into the head of the retort, no additional floor space is required for its operation, and as the mechanism and counter-weights are self-contained, no clearance above the head is necessary. The door and its setting, covered with Fibreglass and painted, give the modern cannery an entirely new aspect as compared with the old retort battery.

Magnum Frigus

The recent cold spell in Britain, though exceeded by Oi-mekon, that place in Siberia where a bucketful of water thrown out simply breaks instead of splashes, brought some strange effects. In order to make ice for Fleetwood's fish, for example, the Fylde Ice Company had to apply to the Minister of Fuel for a permit for 2 tons of coke to thaw out their pipe lines. Such a strange example of the freezer frozen naturally rouses some doubt whether our refrigeration methods are foolproof, and the impulse to seek better methods of freezing our foodstuffs. Fortunately, a new scheme has been proposed, a scheme which simply pooh-poohs Bryant's line on the frost falling "from the clear cold heaven." In an age of rush tactics there is to be no waiting for anything so tranquil; instead, up we shall go to meet it. Briefly, the proposal is to use obsolete warplanes to transport stratospherewards whole cargoes of fresh fruit and vegetables, open to the frosty heaven the compartment doors (the top doors, of course!) and bring down such food refrigerated instantly by what the old thermometer-makers would have called the *Magnum Frigus*, or Great Cold. When Emerson consoled farmers by telling them how the frost which kills the harvest of a year saves the harvests of centuries by destroying weevils and locusts, he little thought of something better, of a single frost on tap which would preserve a year's harvest.

The year 1845 saw Dr. Gorrie introduce the first cold-air machine, which after improvements enabled Australian meat to be brought to England. 1945 is to go one far better with a "cold-air machine" opening up the route to stratosphere refrigeration. No longer need we envy the Greenlander who, in contrast to our expensive upkeep of refrigerating plants, simply preserves his seal fish during his short summer with masses of snow supplied gratis. Henceforth our saluting in song of Greenland's icy mountains is out of date now that "the frost performs its secret ministry," to borrow a line from Coleridge. As for those people startled during the crush periods of rail travel to find themselves overflowing into the milk van, their surprise will be all the greater in rush hours of stratosphere travel. Going up at a speed a Piccard never dreamt of, all aboard the stratosphere express with no pause at the Tropopause, they will indeed have cause to complain when in a period of congestion they find themselves on the Supper Fortress or Cabbage Catalina — especially when those compartment doors are opened!

Jam Manufacture

PART II

GEORGE RAUCH

Metals Used for Equipment

A GREAT variety of metals is used in the construction of jam manufacturing machinery, and there is still a great deal of controversy as to the suitability of some metals which are in direct contact with food. Two main points are outstanding in the choice of metals used in jam manufacture. (1) The food must not be affected by those metals. (2) The metals should be corrosion-proof and should be resistant to fruit acids and alkaline cleansers.

The following is a short survey of their suitability and properties in regard to jam manufacture:

Copper.—The great advantage of copper is its high thermal conductivity which makes rapid boiling possible. A further advantage is its strength and high resistance to corrosion. It is easily repairable and comparatively cheap.

Copper has some disadvantages. Small quantities go into solution and may contaminate the jam. Furthermore, copper acts as a catalytic agent in the oxidation of ascorbic acid and is therefore liable to affect the vitamin C content of jam.

Aluminium.—Pure aluminium is too soft to be used for food machinery. However, different alloys containing it are employed in the construction of machines and utensils. Its advantages are low specific gravity and high thermal conductivity, against which may be put low mechanical strength.

Stainless steel is a general term describing different steel compositions. For the food industry a comparatively soft, easily weldable steel is used. Stainless steel equipment is becoming increasingly popular in the food industry.

Stainless steel is resistant against corrosion and fruit acids. It is not affected by alkaline cleansers. There is no metallic contamination. It possesses great mechanical strength, it does not affect the vitamin C content of jam and has a bright surface and is easy to clean.

Stainless steel is still comparatively expensive. Despite weldability it is difficult to repair and its heat conductivity is lower than that of copper.

Other metals used are zinc, nickel, monel metal and silver. They are used for special purposes and their most conspicuous properties are their resistance to corrosion, otherwise they are of minor importance for the construction of jam equipment.

Boiling pans.—Most jam manufacturers in this country use the double-jacketed jam boiling pan.

Storage Tanks, Rapid - Boiling Pans, and Filling Tables.

Courtesy of William Brierley, Collier and Hartley, Ltd.

The outside is usually made of cast iron, and the inside jacket of copper—frequently tin or silver-plated. Jam boiling pans made of stainless steel, nickel, aluminium, or monel metal are also available. The most important point in selecting jam boiling pans is the speed of boiling. Most pans are constructed in a standard size with 40 gallons capacity for a daily working pressure of 70 pounds per square inch. Some modern rapid-boiling pans work with a pressure of 100 pounds per square inch. Jam pans are constructed for discharge by tipping or with bottom discharge valves. Every pan should be fitted with a steam trap and a back pressure valve. One steam pressure gauge is sufficient for a whole battery of pans. As a uniform steam pressure is absolutely necessary for jam boiling a writing pressure gauge should be installed to record the pressure at any hour of the day.

Fruit Washing Machine

Machines of very different designs are used. The method is usually to pass the fruit through a water bath into which compressed air is introduced. Some very efficient machines are supplied with belt conveyors; the moving belt removes the washed material from the machine and the sorting of the fruit can follow straight on.

Gooseberry Snibbing Machine

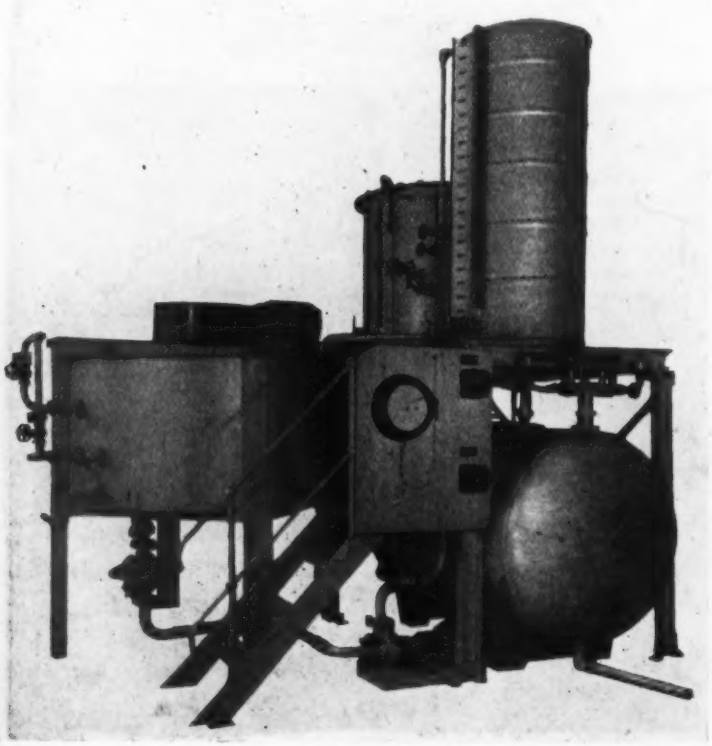
For preparation of gooseberries for jam making or pulping, a gooseberry snibbing machine is used. It consists of an emery-lined vessel in which the fruit is inserted. A revolving movement assisted by water sprays brings the gooseberries in contact with the grinding material. It is possible to use the same machine for the cleaning of potatoes, carrots, etc.

Picking Machine

The picking machine is used for the stalking and cleaning of red and blackcurrants. It consists of an inclined wire screen moving backward and forward. Through the gaps of the screen move mechanical fingers. This machine is very efficient, but it is essential to use only freshly picked fruit; if over-ripe and soft, the fruit is squashed and torn. The capacity of the machine is approximately 500 lb. per hour.

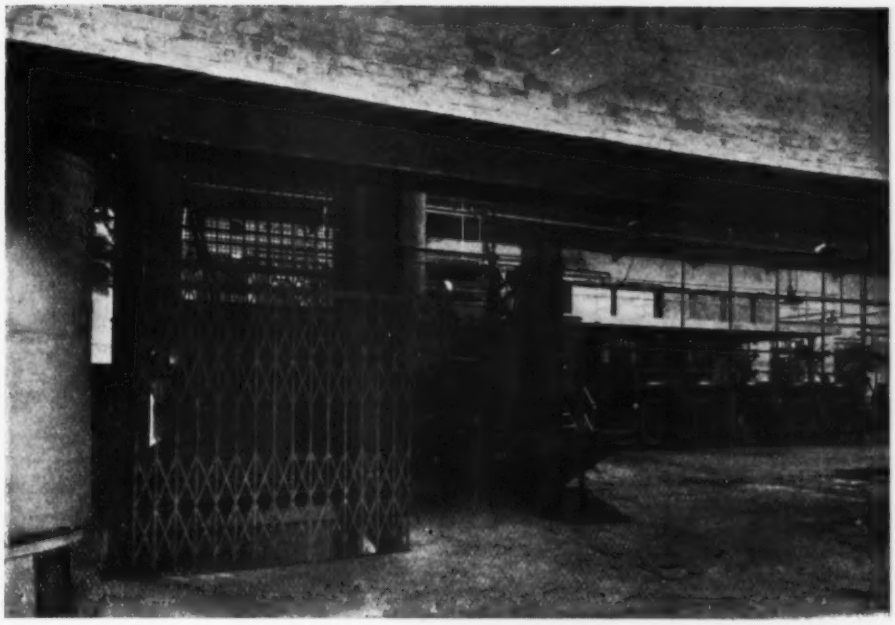
Pulping Machine

Pulping machines of very different designs are used in jam manufacture. The horizontal and vertical types are the basic design. Typical forms usually embody revolving brushes or whirling paddles in a circular sieve. The speed varies from 300 to 600 revolutions per minute. Special stone



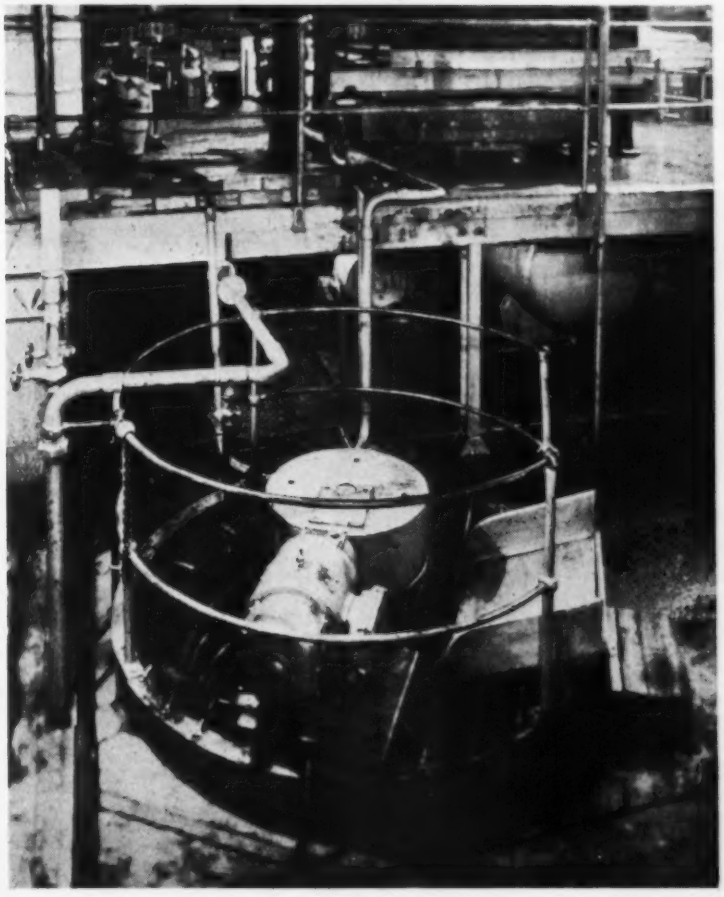
Water and Glucose Tanks, Sugar-Dissolving Pans, and Receiving Vessels.

Courtesy of William Brierley, Collier and Hartley, Ltd.



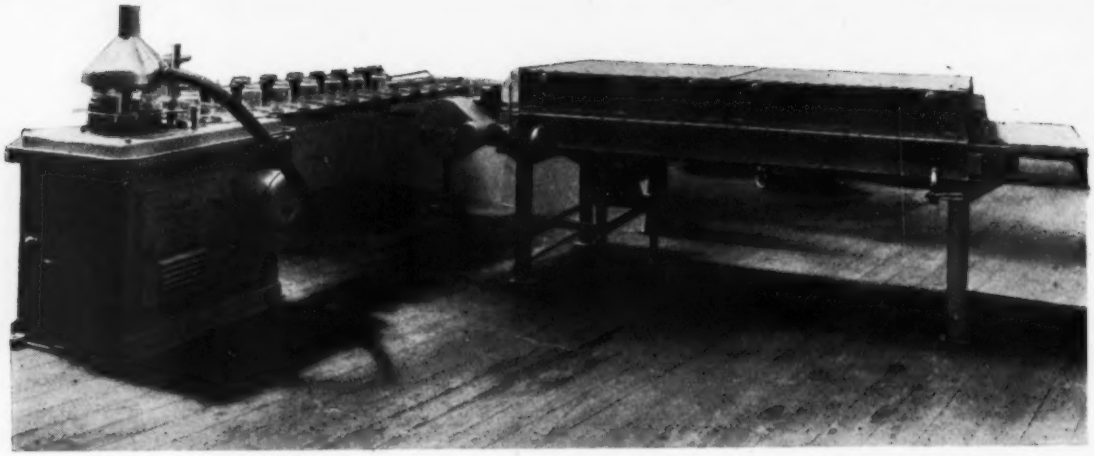
View of Hoist, Sugar-Dissolving Plant, Rapid-Boiling Pans, and Storage Tanks in large factory.

Courtesy of William Brierley, Collier and Hartley, Ltd.



Sugar-Dissolving Vessel sunk in pit in the floor.

Courtesy of William Brierley, Collier and Hartley, Ltd.



Automatic Jam Filling Machine Type 4 FP combined with Jar Pre-heater Type 34 JG, having the heating periods synchronised with the filling speeds. *Courtesy of Kellie and Son, Ltd.*

fruit pulping machines work preferably with lower revolutions. The sieves are exchangeable and made of copper, nickel, aluminium or galvanised iron.

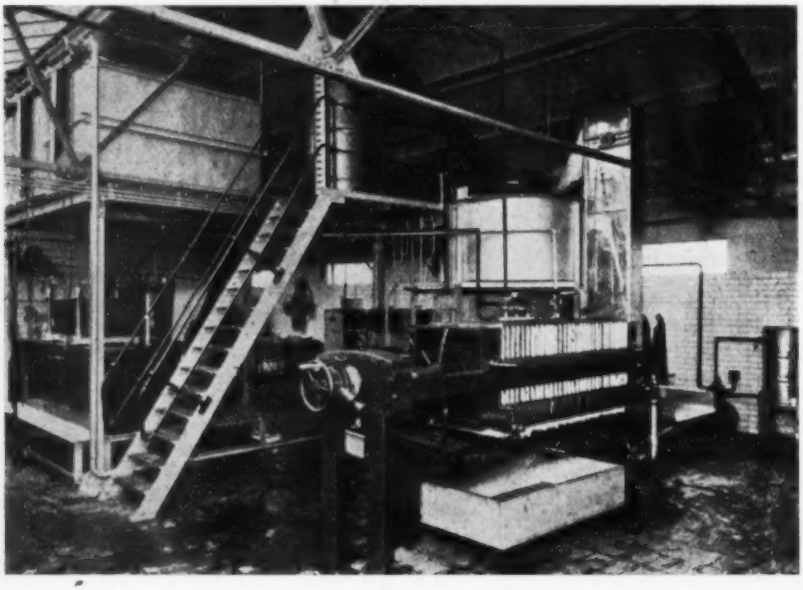
In selecting sieving machines it is difficult to give preference to a particular type of machine. Essential points are: (1) It must be possible to exchange and fit the sieves easily. (2) It should be possible to clean the machine quickly. (3) Metals in direct contact with the sieving material must not affect the pulp.

Vertical pulping machines are particularly suitable for sieving very fine pulps as, for instance, seedless bramble. The great disadvantage of all horizontal pulping machines is the fact that only a part of the sieve's surface is effectively used.

The capacity of a standard pulping machine is between 1,000 and 4,000 lb. of pulp per hour. Some stone fruit pulping machines have an output of as much as 6,000 lb. per hour.

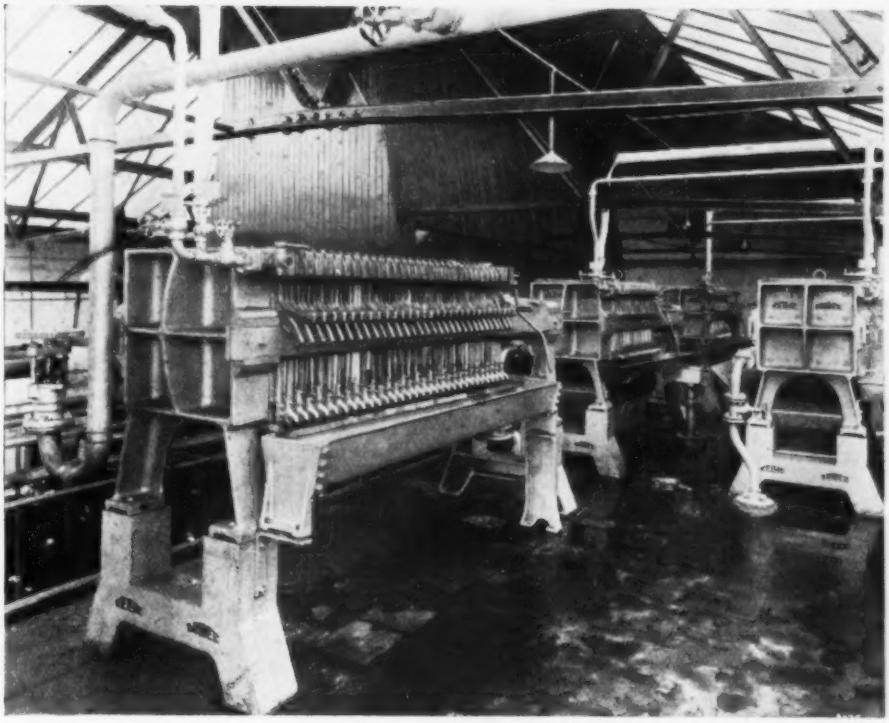
Jam Filling Machine

Efficient jam filling machines are of comparatively new design. They make automatic and continuous filling possible. The jam is pumped into the machine from a reception tank, and the exact amount of jam to be filled can be regulated with a micrometer screw which in turn regulates the stroke of the pump piston. A standard machine has a filling capacity of well over 2,000 jars per hour. Modern American machines have a considerably higher filling capacity. The machine can



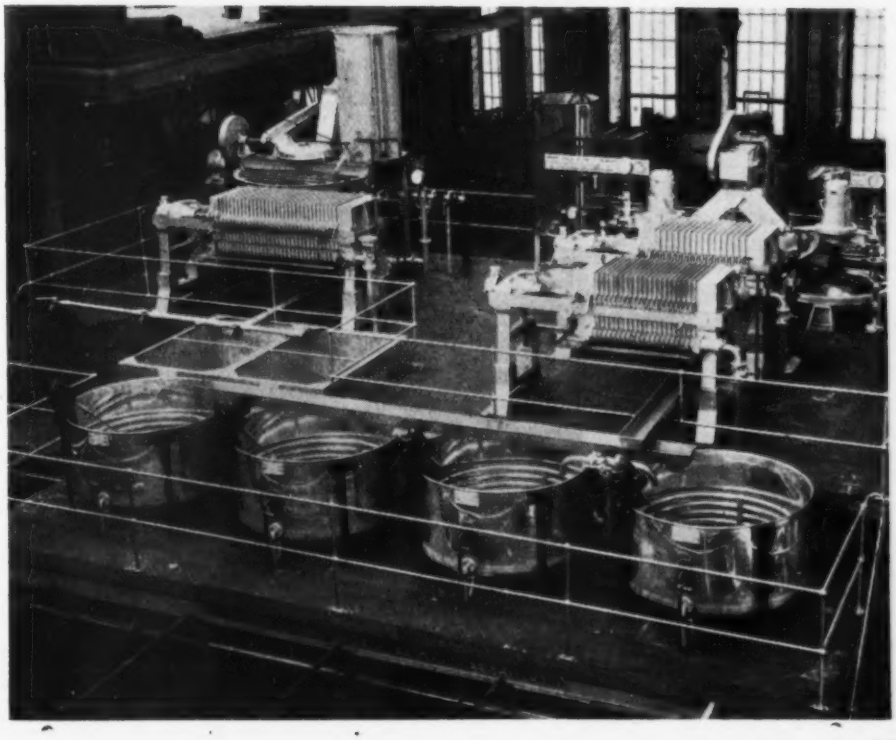
Small Sugar-Dissolving and Filtration Plant.

Courtesy of William Brierley, Collier and Hartley, Ltd.



Typical Layout of Filter Presses —Pulp, Juice and Sugar Syrup.

Courtesy of Kellie and Son, Ltd.

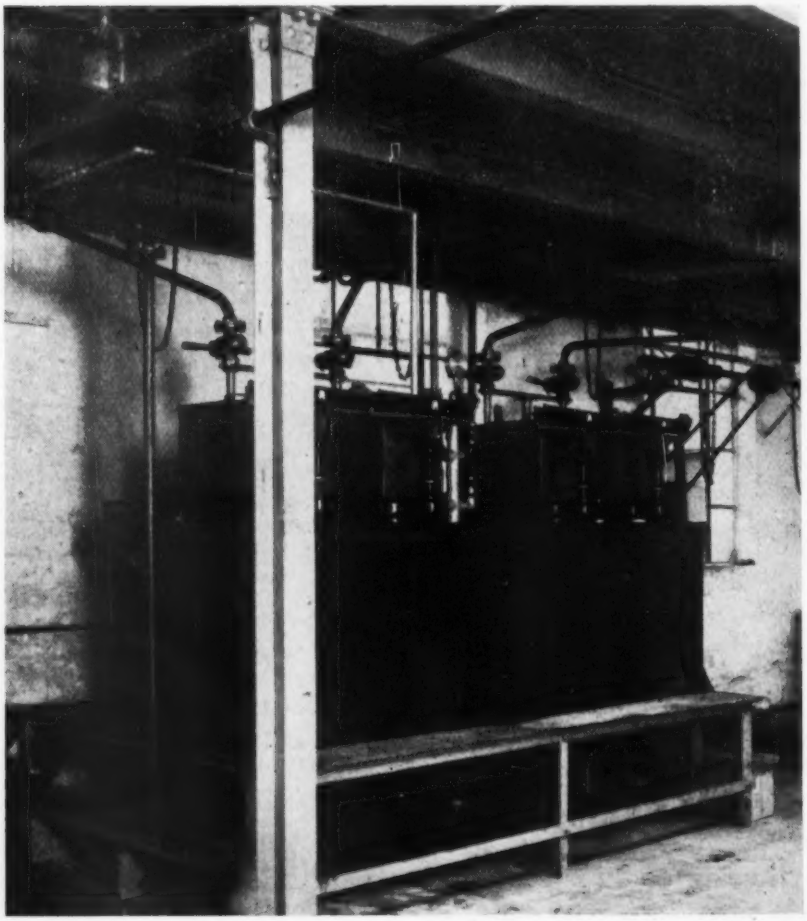


Layout of Juice and Sugar Syrup Filtration Plant, showing Autoclaves charged from floor level by Bucket Elevator; Sugar Melting and Mixing Plant; Fruit Pulp, Juice and Sugar Syrup Filter Presses; Sugar Syrup, Invert Sugar and Juice Storage Tanks.

Courtesy of Kellie and Son, Ltd.

TYPICAL MACHINES.

Type of Machine.	*Capacity per Hour.*	*Steam Consumption per Hour.*
Gooseberry snibbing machine	50 lb. filling capacity (at one operation). 900 to 1,000 lb.	
Picking machine (blackcurrant and red currant)	500 lb.	
Pulping machines :		
(*a*) Standard type	1,000 to 4,000 lb.	
(*b*) Stone fruit sieving machine	6,000 lb.	
Citrus fruit pulping machine	700 lb.	
Orange chipping machine, standard	350 lb.	
Cherry stoning machine, large	1,800 to 2,000 lb.	
Jar washing machine, standard type	2,500 to 4,000 second-hand 2-lb. jars	800 to 1,000 lb.
Jam boiling pans :		
Standard pans, 40 gallons capacity	4 to 6 boils per hour. Boils of 120 lb. finished product	200 to 400 lb.
Rapid boiling pans, 40 gallons capacity	8 boils per hour. Boils of 120 lb. finished product	600 lb.
Sugar melting pan (part of the syrup plant)	32 cwt. of sugar to 200 gals. of water per boil. Boiling time, 15 min. per charge	400 lb. per charge.



Charging Unit.

Courtesy of William Brierley, Collier and Hartley, Ltd.

be adjusted for both 1- and 2-lb. jars or tins. Whole fruit is not crushed and it is possible to fill jam containing stones of moderate size. There is no doubt whatsoever that this machine has come to stay.

Citrus Fruit Pulping Machine

The citrus-fruit pulping machine quarters, peels, separates and pulps oranges, lemons and grapefruit of different diameters. It has a capacity of approximately 700 lb. per hour and represents a great step forward in mechanisation. This machine must already be considered as a standard unit in the manufacture of marmalade.

Jar-washing Machine

Mainly two types of jar-washing machines are used. Small factories usually clean their second-hand jars with brushing machines after they have passed through mechanical soakers. Large factories invariably use the hydro-electric washing machine. Here, the jars pass through the machine on a steel band conveyor, and are treated with hot soda solution, which is forced into and over the jars by a centrifugal pump. The capacity of a standard machine is 2,500 to 4,000 second-hand 2-lb. jars per hour.

A list of typical machines showing their approximate capacity and steam consumption per hour is given on page 86.

Maintenance

The maintenance service of the plant is as important as the right selection of machines. It should be conducted periodically, and be based on a definite scheme. Every machine should be numbered and card-indexed. The card should give the following information:

(1) Maker of the machine, and date of purchase.
(2) Serial number and details concerning insurance.
(3) Dates of inspections.
(4) Repairs undertaken; specification of replaced spare parts; repair costs and time of repair.
(5) Suggestions for improvements.

Every machine should bear a label with instructions which are easy for the worker to understand.

(*To be continued*)

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

The Labelling of Food (No. 2) Order, 1944

Following the decision already announced to postpone the date of operation of the Labelling of Food Order as regards labels until May 1, 1945 (with a further three and six months dispensation to permit wholesalers and retailers to dispose of their stocks), the Order has been re-enacted as the labelling of Food (No. 2) Order, 1944, S.R. & O. No. 1447.

Other amendments to the Order, which experience in advising traders as to their labels has shown to be desirable, have been made as follows:

(1) The statement of composition on a label must indicate the true nature of the ingredient or ingredients of which the food is composed.
(2) Where a complete quantitative disclosure of the ingredients is made, the Order in which they are disclosed need not be that of the proportion by weight in which they were used.
(3) The statement of the minimum quantity of the food must be expressed in terms of net weight or of measure.
(4) Foods packed in advance by retailers on the premises on which they are sold are exempt from the full labelling provisions of the Order, provided the label bears no words referring in any way to the food other than such words or other markings as are reasonably necessary to identify the food and a statement of the quantity or price.
(5) As already announced, the use of a plain liner is permitted where it is not removed from the outer wrapper.
(6) When the presence of a mineral is disclosed as an ingredient in accordance with the requirements of Article 2(3) and no other claim or suggestion is made as to its presence, it need not be substantiated by a declaration of the minimum quantity of the mineral present.
(7) Liquid milk, shell eggs and fish are exempt from the special requirements applicable to foods in which the presence of vitamins or minerals is claimed.
(8) As a result of amendments to the First Schedule—
  (*a*) Wrapped or banded sausages and sausage meat are required to be labelled with a name and address or trade mark.
  (*b*) The ingredients which may be designated as flavourings without further specification are restricted to those products which are used in food primarily for flavouring purposes. (A definition of flavourings is inserted.)
  (*c*) Food colourings when pre-packed for sale as such may be labelled without disclosing the identity of the colouring ingredient, but if the latter is of synthetic origin, the word "colour" must be qualified by either "synthetic" or "artificial."
  (*d*) When any product which is the subject of a monograph in the British Pharmacopœia or the British Pharmaceutical Codex is used as an ingredient of a food it may be named without disclosure of its constituents.

(*e*) In common with sweetened and modified dried milk, it is sufficient disclosure of the quantity of compounded dried milk if the label bears a statement of the equivalent pints.

(*f*) National flour is exempt from the necessity to state the ingredients and a name and address, or trade mark only if it is labelled "National Flour."

(*g*) Speciality flour is exempt from the disclosure of ingredients which are not present in greater quantities than the quantities in which they are customary in National flour.

(*h*) When used as ingredients, deodorised fatty oils may be designated as "edible Oil" or "edible Fat."

(9) The requirements in regard to the declaration of the quantity of vitamins or minerals in a food where their presence is claimed came into force on January 1, 1945, so far as advertisements are concerned. The Second Schedule to the Order indicates the synonymous terms which may be used in the declaration of the vitamin content.

Consumption Level Enquiry

DESPITE the expansion of military needs and large shipments to the Allies, United States and Canadian food supplies for civilians in 1944 in most cases have, as the result of greatly increased production, been maintained or increased as compared with 1943. Food supplies for civilians in the United Kingdom also showed some improvement over 1943, but continued below United Kingdom pre-war levels for many foods and below 1944 levels in the United States and Canada for dairy products, meat, eggs, sugar and fruit.

These findings are brought out in the second report made public recently by the Combined Food Board on food consumption levels in the three countries. These reports provide the Combined Food Board with complete and comparable data on the food supplies of its three member countries.

In both the United States and Canada meat consumption in 1944 has been nearly 50 lb. per capita more than that of the United Kingdom. In contrast, to help compensate for the shortage of other foods, the consumption of potatoes and flour was increased appreciably in the United Kingdom during the war period, and considerably greater quantities of these foods are now eaten in Britain than in either the United States or Canada. In 1944 potato consumption in the United Kingdom is estimated to have exceeded by 140 lb. per capita that of the United States and by 95 lb. that of Canada.

All three countries showed a general increase in consumption of fluid milk in 1944 as compared with 1943. In the United States and Canada meat supplies showed an increase in 1944, but supplies of evaporated milk have decreased in both countries. Other important changes are the improvement in supplies of dried eggs in the United Kingdom, which offset a continued decline in shell eggs, an increase in supplies of fresh fruits and vegetables in the United States and Canada, and the temporary increase in the United Kingdom of supplies of citrus fruit. A further rise in the consumption of potatoes was recorded in 1944 in the United Kingdom.

Butter, sugar, canned milk and canned fruits continue to be rationed in all three countries. In addition, the commodities rationed in the United States were margarine, cheese, the more popular cuts of meat, canned fish, canned tomatoes, catsup and chili sauce, and certain canned juices. Other rationed foods in Canada were jams, jellies, canned fruit, honey and syrups. Apart from bread, potatoes, vegetables and fresh fish, which is in short supply, practically all foods continued to be rationed in the United Kingdom.

Supplies of food in the United States and Canada, measured in nutritional terms, on a per capita basis, have increased appreciably since the pre-war period. Supplies of calories, fats, animal proteins and vitamin A are below the pre-war level in the United Kingdom, but supplies of other nutrients, including vegetable proteins, are appreciably higher. Food supplies of all three countries in 1944 were sufficient to maintain reasonable health.

Soviet Conference on Vitamins

As a result of large-scale experiments during the present war, Soviet physiologists, biochemists, and physicians engaged in research laboratories and in hospitals have accumulated a wealth of material which sheds light on the rôle of vitamins, mineral salts and albumin, the so-called "protective factors of nutrition," in the maintenance of health, in the treatment of disease and in the struggle against infection.

A study has been made of the relation between the need for vitamins and the strain of labour in various branches of production. It has been established, *e.g.*, that workers in the chemical, coal and cement industries have an especially great need for vitamins.

From the beginning of the war Soviet scientists have been working on the problem of securing a wholesome diet for the nation even in unfavourable conditions. Methods have been discovered for obtaining vitamins, albumin and mineral substances from plants, as well as for the use of new food products. A vast amount of information has been gathered by the medical profession as a result of the large-scale use of vitamins in the treatment of wounds and disease. Considerable progress has been made in the study of the physiological influence of vitamins and their clinical employment in finding new sources of vitamins and in the technological processes employed in processing them.

A Conference was held recently in Moscow for the purpose of summing up the results so far achieved, outlining plans for the future, and passing on the knowledge now available to industrial organisations. Stress was laid on the need for carrying on the work into the post-war period, especially for children. Several sessions were devoted to the problems of agriculture, which alone can supply the people with foods rich in vitamins. The rapid restoration of agriculture will make it possible to offer the nation the essential balanced diet.

The Conference was attended by more than 1,000 delegates, representing some 200 organisations.

Milk Pasteurisation and its Alternatives

J. G. DAVIS, Ph.D., D.Sc., F.R.I.C.
Scientific Adviser, Express Dairy Co., Ltd.

MILK seems to have an irresistible fascination for the amateur dairy scientist. At almost regular intervals we read impressive articles describing how milk can be preserved without pasteurisation. A detailed account of a painstaking research from a reputable institution often excites little interest in the outside world, while a breezy article which presents a very old idea in a new dressing, usually without any experimental evidence at all and consisting largely of mysterious hints and vague suggestions, attracts considerable attention. The most imposing are those linking the idea with some foreign scientist with an impressive name, but one unknown in dairy science circles. Considerable prominence is also given to statements by members of Parliament, novelists, peers, dramatists, and medical officers and people distinguished in various walks of life. However, because a man is a good politician, novelist, or medical officer, it does not follow that he is an equally good dairy scientist, a point which is often overlooked by the reading public.

Pasteurisation Wicked?

The Press is continually fed with implications and assertions that the pasteurisation of milk is a wicked thing, morally, nutritionally, and economically. Even the more broad-minded critics appear to adopt the attitude that it is the best practical expedient until we can obtain a "pure milk" supply. Mr. George Bernard Shaw, in his latest frolic, *Everybody's Political What's What,* deals with the whole problem in one masterly stroke. He declares that "pasteurised milk is undrinkable." This seems a sweeping statement, but possibly he really means "*I* cannot drink pasteurised milk." Now Mr. Shaw, we know, has spent a considerable time in London, and in London about 98 per cent. of the milk is pasteurised. It is possible, therefore, that Mr. Shaw may at one time or another have drunk the undrinkable, especially as carefully controlled experiments have shown that even self-proclaimed experts are unable to distinguish between raw and pasteurised milk on the majority of occasions.

Not only our playwrights, but our politicians, are eager to instruct us in the science of milk technology. Mr. Clark, recently the independent candidate for Berwick, is reported to have said: "To preserve milk, let it go sour." Although this sounds suspiciously like the Athanasian Creed, it is doubtful whether 10,000,000 British housewives would approve of the idea if they found on the doorstep one morning some 20,000,000 bottles of soured milk.

Some contributors tacitly assume that pasteurisation is an unsatisfactory process and will only be tolerated until an acceptable alternative is found, and then proceed to announce that they have discovered the solution to the problem—the alternative that the whole industry is waiting for. Exactly why these writers should make this assumption we have never been able to discover. The greater proportion of milk in the household is raised to boiling (100° C.), which naturally does much more damage to the milk than pasteurisation, which only involves raising to 63° C. Even when we make tea we are, in effect, pasteurising the milk, so why there should be this vehement outcry and disparagement of pasteurisation is difficult to understand. What is required by most of these critics is a sense of proportion.

Safety and Keeping Quality

Too often they are woefully ignorant of both the scientific facts and the economic requirements of the dairy industry. Most of the processes suggested are considerably more expensive and much less efficient than pasteurisation. Moreover, it is common to find that the writers confuse *safety* with *keeping quality*. Thus they appear to assume that because a treatment will reduce the numbers of bacteria in milk and enhance keeping quality, therefore it is a possible alternative to pasteurisation. This is a most serious error, since efficient pasteurisation will kill all pathogens, but the proposed alternative treatments have not been shown to do so.

Many ideas for the preservation of milk have been put forward. Some of them, such as electrolysis and infra-red rays, are only effective through the heat they generate in the milk. Others, such as intensive freezing, supersonic waves, ultra-violet rays, carbonation, pressure changes, and oxygen under pressure, will produce varying decreases in bacterial count or hold up proliferation for varying times. A third group relies on preservatives such as hydrogen peroxide and formalin. These are, of course, illegal, but are still served up at intervals in various guises.

Two examples of the second group are the articles by E. P. Smith, M.P., on carbonation in the *Dairyman* (September, 1944), and by A. P. Newall, M.I.M.E., on deep freezing (October, 1944).

Carbonation of Milk

Carbonation, which is the application of carbon dioxide under pressure, is not very effective as a bactericidal agent. Bacteria can resist pressures

up to 50 atmospheres. Sudden changes in pressure are, however, more effective than high pressures of themselves, and probably a considerable killing effect could be obtained by subjecting the cells suddenly to a pressure of, say, 50 atmospheres and then suddenly releasing it. Such a process applied on a large scale would be expensive, and there would be that old enemy to contend with—foam—which is a perpetual source of trouble to practical dairymen, and for which there is no simple solution except that of avoiding conditions leading to foaming

Carbon dioxide itself has little bactericidal power. For example, the ordinary souring organisms of milk in hot weather produce large amounts of CO_2 and yet the bacteria proliferate rapidly.

The notion that the summer surplus could be stored in large tanks preserved with carbon dioxide will bring a grim smile to the faces of those with any experience of looking after the tanks necessary to hold one day's supply. It is serious enough when a 3,000-gallon tanker becomes solid with soured milk. The prospect of our summer surplus —say, 200,000,000 gallons—being dug out with shovels is too awful to contemplate.

Freezing

The application of freezing is more practical, since refrigeration is the most certain and least objectionable way of preserving milk. Indeed, there is only one objection—that of expense. There are two critical temperatures for milk as far as its flora is concerned: 43° F. and 55° F. Below 43° F. the bacteria of milk are, for all practical purposes, static, and above 55° F. growth becomes increasingly rapid. Thus commercial milk will last a long time at 40° F., but will sour rapidly at 70° F. If ordinary commercial raw milk is pasteurised and protected from after-contamination it will remain sweet for up to a month at refrigerator temperatures (*c.* 35° F.).

It may then be asked: "What is the point of deep freezing as proposed by Mr. Newall?" The cost of cooling milk to 38° F., as in ordinary commercial practice, is an appreciable item; to cool milk to temperatures below 38° F. and to hold it at this temperature becomes increasingly expensive. The cost of cooling milk in bulk to −120° F., as apparently suggested by Mr. Newall, would be fantastic. As a small comment on this point, we may mention that the specific heat of milk is 0·93, whereas that of steel is about 0·1.

Deep Freezing and Bacteria

Next we may enquire what advantage would be gained by this deep freezing of milk. If it is thought that the process would kill all the bacteria in milk, we may remind Mr. Newall that even pathogenic organisms have been shown to survive for long periods at very low temperatures without losing their characteristic properties. This ability of bacteria to survive freezing is so general that freeze-drying is now the recognised method in bacteriological laboratories for preserving cultures! It is true, of course, that a proportion of bacteria is killed by freezing, but the process cannot be relied upon to kill even all pathogens and so make the milk safe.

A final point to be considered is that when frozen milk is thawed the physical structure is affected and the milk has a curious feel in the mouth. Probably the most useful application of refrigeration to milk will be to effect dehydration without involving destruction of the vitamins or loss in solubility. In other words, instead of boiling away the water we can freeze it and remove it mechanically as ice.

To sum up, then, it is unlikely that any fresh method will take the place of pasteurisation. If we can afford to spend more money on making milk safe and improving its keeping quality, we should more sensibly use it to improve the methods of preventing after-contamination—*e.g.*, as in the in-bottle method.

Milk Powder

The obvious solution to all the problems of the milk supply is milk powder. When ultimately the technicians have evolved a powder which can readily be reconstituted to give ordinary milk, we shall have a product which is safe, of indefinite keeping quality, and easy to store and transport. This will probably be made by a low-temperature spray process in which a dehydration stage by freezing may be involved.

The less money we spend on transporting a fluid of 88 per cent. water content round the country, the cheaper will become the price of milk. The logical final stage will be a network of drying centres throughout the milk-producing areas. With only short distances for the clean milk to travel and twice-a-day collection, farm refrigeration would be unnecessary and the milk could be dried within a few hours of production still more economically, since it would still be warm.

The ideal method would, of course, be drying on the farm, with collection of the dried milk weekly or even monthly. We are perhaps peeping rather far into the future in visualising the farmer of the future pouring his milk, not over a cooler to lower the temperature, but into a plant which raises the temperature and then dries the milk under reduced pressure or in a blast of hot air. It is unlikely that such a method would ever be feasible for the small herd, but it is probable that in the future we shall see a steady trend towards the economic herd of about 100 milking cows giving 200 gallons or more a day. If four such farms were organised to have adjacent dairies, one plant could handle the 1,000 gallons at an economic rate. The fantasy of to-day is the ordinary event of to-morrow.

Food Packing

Progress in 1944

R. L. ROWNEY

THE MILITARY chiefs may or may not have expected an end to the European war in 1944. Industry certainly did. In one sense, therefore, it is wrong to talk about the 1944 development of any industry whose concern is not solely with swords as war development. War development, in the sense of fundamental new adjustment to war conditions, was indeed completed before 1944 started, and it is true of a large section of the economy, and certainly of the food packing industry, that the real developments for which 1944 will be remembered were those more concerned with the post-war future than with the protracted war present. And this is true even though the screw of restriction has not been loosened—has, in fact, been tightened further in particular, and minute, instances—and though the demands made upon the industry for essential purposes have been greater, not smaller. It is not that any new major laboratory discoveries appeared to blazon the post-war path, either in the matter of new materials or of new uses for old ones, but that there was a consolidation of previous research and its direction towards practical application, and that the whole business of research was provided with a wider basis. Of this, the results will be seen later. Nor, in saying that the significance of last year in British food packing lay mainly with the post-war, is it intended that there was no new level of achievement in a war context worth recording. 1944 saw the Allies invade Europe and the Far-Eastern war flung open to an altogether new and wider scale of activity, and consequently it saw very strong demands made upon the resources of the packers. It was a year of record-breaking in the supply of packed food reaching the armed forces and the dogged civilians, and this was attained in the presence of all the old difficulties, some of them intensified.

Three Difficulties

It is well that the difficulties should be mentioned, for the industry, for all its size, importance, and public appeal, has no central publicity organisation that can tell the world against what odds it has done the great thing it has done. Broadly, they were three. The giant difficulty Labour did not lessen in 1944, and it did, in cases which can be specified, quite appreciably hold up production. The Raw Material difficulty continued, and hopes of improvement were disappointed, as will be shown. The Fuel difficulty, which no one ever expected would become so crucial in Britain, also proved impermeable to hope, and even to the Porter Award in the coalfields, and has been a substantial production influence. Labour and Fuel, however, need no examination here. Their pros and cons are now a commonplace. What is of particular interest, with its pointer to the future, is the raw material position.

Raw Material Problems

A shortage of the conventional raw materials of food packing would, at a certain point, involve one of two things, or a combination of them. It would mean the elimination of packaging from all but the absolutely essential categories, and in this sense might compel a radically changed food policy. Or it would mean the use of new, substitute materials, of which the implications might be profound, not only in the packing industry itself but also in the popularity of certain foods, and in their availability.

In the earlier war years, and following the intrusions of the Japanese, tin and rubber became in short supply, and it was then that the claims of alternatives such as the plastic varieties were strongly pressed. But Britain followed Germany in substituting for tin blackplate treated with rustproof lacquers and contrived fairly well in the tough years 1942 and 1943. It was hoped that 1944 would see the fruition of plans to increase the extra-Pacific tin supply, which before the war was about a third of world production (quite a proportion compared with rubber, of which nine-tenths came from areas subsequently under Japanese control), but expectations were disappointed. Bolivia, the main accessible producer, shipped 42,884 metric tons in 1941, 38,901 tons in 1942, 40,959 tons in 1943, and the figure fell back to the 1942 level in 1944. Nigerian production, which rose well in 1942, fell again last year. The Belgian Congo shipped 2,000 tons less than the 1943 total of 20,000 tons. In steel, the position was rather better, with no serious factory-end shortages, if no lack of late delivery.

The bottling side of the industry has had its complaints, but here the reclamation section has improved considerably (the Container Recovery Service last year reached its target of 1,000,000 containers of all sorts reclaimed in a week), and the overall shortage was no worse than in 1943. Nor has the paper position fallen off appreciably, with interesting developments in Scotland (and much more to come, according to Mr. William Tait).

The raw material position generally, therefore, while not improved was not sensibly worsened, and it may be that the failure of plastics to develop their much-advertised threat to the traditional materials of packing owed something to this relative sufficiency. But plastics themselves are, for the most part, derived either from coal or petroleum, and any

picture of their substitution for tin and steel and glass and rubber and paper and board on a major scale in wartime could not overlook the implications of a vastly broadened call for these two vital war supplies.

The Factory End

In the field of factory processing 1944 was not a year of significant advance, but a word should be said about the further progress made in the interesting field of dehydration. FOOD MANUFACTURE long ago drew attention to the fact that the development of this food process must involve important new devices in packing, and the demonstration staged by the canning committee of the Scottish Council on Industry last June was provocative of much thought among the many packaging men and food experts who attended. Dehydration, from the packaging point of view, must affect the problem in two ways and may affect it in three. It must convert liquids or near-liquids to solids, and it must greatly reduce the bulk. It may also change the chemical requirements of the pack. All three influences are plainly present in a can (now a conventional packing means for this product) of powdered milk, and in compressed milk wrapped in greasepaper, both of which were shown. Can packs for dehydrated vegetables (some gas-packed, but not all) reached a new point of development in 1944, and experiments are being continued energetically.

From America came detailed reports of hermetically sealed aluminium containers, made by impact extrusion, and adaptable for either metal or plastic caps, specially applicable to dehydrated foods. In the author's opinion it is appropriate to consider the implications of dehydration in conjunction with the implications of the promised great extension of air travel. The day may not be far off when it will be an economic proposition to convey the dehydrated equivalent of 10 tons of, say, potatoes, aluminium packed, to its market by aeroplane, and for the cargo to take up no more room than a few cwt. sacks. As yet, for all the progress made under the stress of war and for all that it is one of the oldest systems of food preparation, dehydration is in its laboratory infancy, and one would not care to set a limit upon its potentialities. At the Low Temperature Research Station, where Sir Joseph Barcroft, Chairman of the Food Investigation Board of the British Department of Scientific and Industrial Research, has welcomed groups of visitors, lunches composed entirely of dehydrated foods have been served, and very good lunches they were. At the Station practically every natural foodstuff, or its type, has been successfully dehydrated, and the many factory plants erected since the war (some of which came into full operation in 1944) are turning out millions of dehydrated packs for military and other use and for store. The feeling in the industry is, not unnaturally, that it is a risk of capital to instal expensive plant which research may render obsolete in a few months, but for all that the immediate post-war is likely to witness important trade developments by established concerns in the production and packing of dehydrated foods.

Glass

In glass it is important to distinguish between the special stimuli produced by war conditions, with the pressing metal shortage and the long-term influences which will reassert themselves after the war. In 1944 the logical tendency for switching from metal packages to glass (logical because of the greater shortage of the former) remained, but the substitution movement gained no important ground, except in the United States. Progress was certainly made in the direction of protecting the glass pack. The cork-lined sleeve deserves special mention because of its simplicity, effectiveness and relative economy. This is a simple device of compressed paper cork-lined inside, which is wrapped around the glass container and secured only (but effectively) by the identification label. Packers will remember these wrappers, which tried hard to find a market before the war against the competition of the established straw envelopes, and which only partially succeeded. Last year they extended their market. But, apart from the ineluctable manufacturing difficulty of the changeover, there is finally the question of impact resistance, which, cork protector, or straw, or paper, can never be as high in glass containers as in metal, or, let it be said, in certain plastics, and which is a quite final determinant of the possible degree of substitution. 1944 did see some minor development of glass packing, not so much in Britain, where the scope is more limited by rigorous material control, as in the United States, where experiments with shaping have produced, *inter alia*, the square glass milk bottle. If we live to see a dehydrated packing world, however, we shall see glass packing of food hard put to it to find a *raison d'être*, for the very special use of glass is in containing liquids and near-liquids.

Reaction or Progress?

1944, which dotted the i's and crossed the t's of the adjustment of packing to war conditions, also emphasised the fact that, while the industry must not lose the valuable lessons which it has had perforce to learn, and must not see its post-war future in terms of a simple reaction back to 1938, at the same time so much of the determining conditions of war packing is foreign to peace-time requirements that the wheat of what is relevant will have to be strictly sorted from the chaff of what is irrelevant. In this connection the Anglo-American Services Exhibition on Preserving and Packing, given at the Central Ordnance Depot at Feltham, was significant.

Food packers, sending to the armies of the tropics, remembering time and the means of transportation, the insects that attack, the climate that destroys, must provide a degree of protection that

in normal commercial conditions would be supererogatory. This admittedly applies less to food packing than to the packing of the materials of war, but it does apply.

The U.S. Office of War Information announced last summer that "scientific" packaging had reduced Army food losses to about a tenth of the losses suffered at the beginning of the war. But packages will receive, when the war is over, their accustomed skill of handling, will endure only the normal passage of time between packing and unpacking, and will not run the water risks that, in 1944, made the moisture-proof pack a holy name among fighters in the Far East. This is said because it seems to the author that the fuss made about the lessons for peace of packaging for the armed forces in distant theatres have been largely misplaced, and because it appears important, with 1945 building up rapidly to the end of the European war, that food packers should have clear ideas as to their post-war lines of policy.

If National Canning intends to supply the inhabitant of the Burmese jungle with dehydrated apples, then by all means study the long-distance, slow-travel, unskilled-handling, extreme temperature-variation, practices of this section of war-time packing. Otherwise, it would seem that factors more consistent with pre-war experience will apply more intimately.

On the other hand, apart from the evident laboratory lessons which the war has taught, there is the valuable experience, ably reported in the "British Standard Packaging Code" produced by the Anglo-American Packaging Committee of the Ministry of Production, which lays down a very correct, and by peace-time standards very advanced, law of packaging, concerning which type of pack is most suitable for which commodity, how a package should be handled, and how packages can be accommodated in the available travelling space so that the maximum fits into the minimum with Euclidean precision. There is no space in which to discuss the Code in any detail, but it is recommended for study by all whose lot is cast in the packaging industry.

The Afterwar

The belief that 1945 will see an end to the war in Europe is sufficiently well founded to have already inspired a number of the boards of important packaging concerns to devote careful thought to post-war policy, and it is to the main considerations here that the rest of this article will be devoted. A year ago it was still possible to talk of two schools of thought, the "back to normal" school, and the "good-bye to all that" school, but 1944 has seen opinion sobered by the need to make practical decisions (we all thought the war would end last year), and the old division no longer operates. Conversation with many leading personalities in the industry persuades the author that food packing will select from its war-time experience the characteristics relevant to ordinary conditions, but that it will also not fail to recognise that the conditions of the post-war will not be ordinary in the sense of being identical with those of 1938 and before. It is in this interpretation of the industry's awareness of the problem with which 1945 will present them that the preparatory measures of 1944 are to be considered, and the prospects for the future assessed.

Research

As to research in general, the work of the Printing and Allied Trades Research Association deserves mention for its success in investigating the suitability of different papers and packaging materials for special war functions, but it cannot be said that PATRA added substantially last year to existing knowledge on the application of the range of packaging materials which primarily concern it. In this broad section, the main contributions of 1944 were the development of such materials as the new waterproof container board, the K.B. Bitumen board, which was actually introduced in 1943 after intensive laboratory test, and the good progress made by "Juteboard," another 1943 patent, and an efficient substitute for crate and case bulk packaging over a fairly wide range of products, notably canned foodstuffs. Great things, however, are expected of the widely drawn PATRA programme, including as it does the problems of moisture penetration, adhesives, and package strength as high priorities, and involving the exploration of the uses of new materials.

Advertising Pays

At this juncture it is important to understand that one crucially important aspect of packaging has inevitably been neglected. Less research than one would have liked has been conducted to develop the pack of optimum efficiency (which word is intended to embrace all that is meant by product protection), but infinitely less has been possible in the direction of obtaining optimum consumer appeal. The food packaging industry will recall (some not without humour) the lavish sales talk to which the American public was treated before the war on behalf of glass packaging, but the success of this campaign, whose theme was "See what you buy," indicates the extreme importance from a business point of view of using the pack not alone as an efficient container but also as an advertisement. To call this "prestige packing" is an inadequate way of describing its broad function. This question has certainly not escaped attention—it has, to the author's knowledge, been a subject of discussion at many board meetings—but it has simply not been practicable for the industry generally to make any important progress in a field where the initial determinant and the final answer may be gauged only by intensive market research, and where the scope for

factory operation depends upon the availability of materials some of whose futures are shrouded in mystery.

The Cost Factor

Thus, the food packaging industry is faced with three major questions, the first referring to the product, the second to the efficiency of the pack, and the third to its consumer-appeal, and the answers to them, in the post-war which will begin this year, cannot be extracted simply by laboratory research, or market research, but must be related to the past, to the established equipment, resources and processes of the industry, and related also to the overriding cost factor.

The tendency of so much that is written on the industry's future is to overlook the fact, so deep in the experience of the industry itself, that the cost accountant damns many more fine proposals than ever emerge from the board room. It is necessary to insist on this qualification, for all the economic pointers are towards a rising trend of raw material prices after the war, and, since such movements never move evenly over so wide a range of materials as is implicated in food packaging, some will derive from cheapness a fortuitous attraction that would never be theirs on merit alone. The whole struggle between the older materials, like the metals, glass, paper products, and timber, and the new, like plastics, is bound to be overshadowed by the price consideration, and it is also possible to envisage switching movements among the conventional materials derived from the same cause.

The Product

Given this, however, it is possible to talk of certain tendencies which, other things being equal, are likely to make rapid progress. First, the product. Quick-freezing has probably come to stay in the luxury foods class; dehydration has certainly come to stay in all the price categories. The former is not a specially potent influencer of package design, though it patently has its own special requirements, but dehydration is such an influence. The common pack for dehydrated foods will undoubtedly continue to be the tin, though it has been suggested that glass would be equally appropriate and of greater consumer appeal. The author's own view, after inspecting a wide variety of packs and hearing at least six times as many opinions, is that the can will have it, but a can constructed with an eye to its appearance in a competitive shop window, and in a manner fitting to the reduced need for chemical and shock protection. As much as glass, there seems scope for some development of packing in paper derivatives, where the protective requirement is suitable. These are the two new methods of food preparation that are capable of exerting an influence on packaging. For the rest, the scope lies in the perfection of existing means, in possible substitution of materials, and in a new intensity of concentration upon the advertising value of the pack.

The Pack

Second, the efficacy of the pack. Here it is necessary, as has been suggested above, to relate the lessons of war to the needs of peace, but without claiming too much it can be said that, after trial and error in 1944 and previous war years, the food packing industry is technically prepared to start off the post-war, not where it left off in September, 1939, but at a stage of knowledge considerably advanced from that level. This applies not only to the many surprises we have had concerning the thickness of packaging material required to yield adequate protection (what a waste there used to be in the unscientific name of margin of safety!), but concerning also the processing of the materials, and the relevance of materials for specific packaging jobs. In the last connection must be mentioned the chances of a restoration of the old "spheres of influence" of glass, metal, wood, and paper products, which have been overlapped in war-time to a large (though not so large as most observers had expected) extent. The power of the reversion to type influence should not be under-estimated, particularly when it is associated with branded foods and goodwill generally, but one factor has emerged that tends to reduce it. That factor is, of course, the advent of plastics as packaging materials of wide application. FOOD MANUFACTURE has previously had occasion to criticise the visionaries whose very dreams are made of plastics, but the later tendency, to under-estimate the potentialities of the wide plastics range, is also to be condemned. In closures plastics have found an immediate niche, and 1944 saw some useful research both here and in the impregnating by plastics of paper-based material. But sealing is only the teething stage for this commodity, and the many wars against plastics decreed by companies concerned with the older materials are themselves proof of the promise of plastics, and an example of the reason why the entry of this new runner into the race means that the customary assortment of the field cannot be relied upon to reassert itself. The user of cans who switched to glass will not switch back until he has seen how plastics may serve him. At the moment, of course, price and availability are against plastics, and they will continue to be bearish factors in the early post-war phase, but the shortages of metals, paper, wood and glass will also not be solved overnight, while their price bases, less dependent on the whole upon the element of manufacturing skill and more open to the play of general inflationary forces, are likely to trend upwards at a time when expanding production is tending to reduce plastics costs. Much research, however, will be required before it is possible to assess the suitability of plastics for food packaging.

The Eyes Have It

Third, the very vexed question of consumer-appeal. It is an obvious truism that the design of post-war packs, and the selection of packaging material, will be determined with an eye to the public's æsthetic sensibility, which must needs love the highest-looking when it sees it. It does not seem to be equally generally realised that from this very source springs the resistance to new departures in packaging. Goodwill, the tendency of the buyer to buy the same product again, is so largely a matter of usage. In 1944, when a number of concerns made such arrangements as they could against the arrival of what seemed imminent peace, the dilemma confounded many policy-makers. A plastics container may be more attractive than a tin, so it would presumably be good sales policy to make the switch. But the tin was a common sight in every larder and epitomised a certain food. By reaching higher, in the realm of the unexplored, shall the accepted good of the well-known be lost? It is not an easy choice, and in this conservatism on the part of packaging companies, which reflects the conservatism of the consuming public, new materials may find a very real impediment to their full development. On the general subject of consumer appeal, particularly in its export connotation, a book could (and should) be written. It must suffice here to say that the problem is very much with the industry, and that in 1944 there was a deal of behind-the-scene activity on it.

Tailpiece

In this very brief review it has been possible only to touch on some of the major indications in the food packaging industry as it goes into the year of victory. Of its war-time record a full appreciation will some day be written, and it will surprise and gratify the great public that the industry has so sedulously and efficiently served. Its post-war future is a vista of enormous opportunity, and the present year will see its beginning.

Flour Milling

T. H. FAIRBROTHER, M.Sc., F.R.I.C.

IN 1936 Leslie Smith—whose name is well known throughout the milling industry in most parts of the world—and Messrs. Thomas Robinson and Son, Ltd., milling engineers, of Rochdale, made a joint effort which has proved a great boon to all students of flour milling technology in the publication in book form of a series of lessons delivered to the Liverpool classes in flour milling during 1935-36. Not only did this prove a boon to new students in the industry, but proved a stimulating refresher to many of us, whose normal student days are over, but are still willing to learn.

Through the generosity of Messrs. Thomas Robinson, the first edition, which consisted of 270 pages, was made available to students at the modest price of 3s. 6d. In its early form the book was really a printed record of the lessons, and the only index was a list of contents. In other words, it was a complete and correct form of what the student's notes should have been. Later on the book appeared, amplified and up-to-dated in two volumes. The first dealt with the Intermediate Course (Descriptive Knowledge of Machines), the Final Course (Advanced Knowledge of Operations), and part of the Intermediate Science of the syllabus approved by the City and Guilds of London Institute. The second was a continuation of that syllabus and dealt with the Principles of Milling Processes, Management, and Final Science. Unfortunately, owing to enemy action, the remaining stocks of these two volumes were lost when the premises of the Northern Publishing Company were destroyed. Fortunately for the milling industry, Leslie Smith, in spite of his manifold activities, has found time to revise the work and publish it again, this time in a single volume. With his characteristic generosity Leslie Smith makes full recognition of a number of his colleagues in the milling industry for the part they have played in making this further contribution to the literature of flour milling possible. The present book* could really be described as two in one. The first part, which embraces 44 chapters and occupies 376 pages, deals with flour milling proper. After four chapters dealing with wheat—its characteristics, where it is grown, what impurities it may contain, and to which diseases it may be subject—the book plunges into flour milling processes, starting with wheat intake and ending with an interesting chapter on the Layout of Mill Premises and Mill Design. In this section one or two chapters are included that some of us might have included in the second section of the book, which deals with the Science of Flour Milling. These include Flour Improving and Bleaching, which would more naturally form part of Chapter 62, and the Diseases and Enemies of Wheat and the Deterioration of Wheat in Storage. If one must level a minor criticism, one might suggest that

* *Flour Milling Technology*. By Leslie Smith. London. Pp. 571. 21s.

fumigation methods deserve more attention than is given, as these are now becoming a regular routine in most flour mills, and every student who aspires to mill management should know much more about fumigation than is given on pages 46 and 47. One doubts whether the statement that ethylene oxide is definitely more toxic to insects than hydrogen cyanide is correct. In the reviewer's rather long experience the reverse has been the case in large-scale practice. Doubtless the statement is based on experiments carried out *in vitro* by entomologists interested in the popularisation of ethylene oxide, but in large-scale fumigation the reviewer has found a more thorough kill and lasting effect by the use of cyanide than ethylene oxide.

Processes and Machines

The following chapters, 5 to 28, are purely and simply technical, dealing with the various processes and appropriate machines. They are excellent. After that the arrangement is not so logical; for example, the Design of Flow Sheets should naturally follow the chapters on machines, rather than be sandwiched between the two more scientific chapters dealing with Flour Improving and Bread-making Qualities. Chapter 38, dealing with the manufacture of Specialities, is rather unsatisfactory, the errors being rather of omission than commission. As the book has been published in 1944, one would have thought that some consideration might have been given to the various changes in flour extraction that have occurred owing to war-time exigencies, and some of the changes in milling technique occasioned by the switching from 70 per cent. extraction to 85 per cent. These exercised the ingenuity of millers and milling engineers to the fullest extent, and the reviewer remembers well how certain well-known milling engineers suggested quite the wrong way of getting the best 85 per cent. flours! A chapter devoted to this would have been a stimulating exercise to the student, even if only relegated to a place in the appendices. The author evidently expects a return to the pre-war extraction of 70 to 75 per cent., and the book is based on this assumption. Whether this will actually be the case is open to doubt. Most reasonable people hope so, but one ought to anticipate the possibility of a continuance of higher extraction flour, forced upon the community by a very small but influential body of scientists who seem really to believe that the only source of vitamins or anything else of value to the human body comes from bread alone, and that bread is the only taxi in the rank to health. Again a minor criticism—another case of omission—is the neglect of fortification of bread. In the reviewer's modest opinion the public will demand white bread and the nutritionists will demand vitamin standards, so fortification seems the only solution to the problem. As so much has been done on this subject in America (and here as well), some reference to the subject in some detail would have enhanced considerably the value of this already valuable book.

Science Section

The Science Section comprises nineteen chapters and, as would be expected, embraces such essentials as machine drawing, elementary physics, mechanics, and chemistry. No special comment is called for here. One feels, however, that Chapter 61 (Elementary Principles of Bread-making) should be joined on to that by Dr. Amos (Chapter 32) on the Bread-making Qualities of Wheat. Incidentally, Chapter 61 is very reminiscent of Chapter 17 of Jago's classic work on the Technology of Bread-making. This section ends with a chapter on Moisture Testing. The author acknowledges the assistance of Mr. H. Horace Ward in this connection. This important section of wheat and flour examination is brought completely up to date even to a description of the moisture meter recently designed by the National Physical Laboratory and supplied by the Ministry of Supply. Reference is made to the necessity for the user of the meter to make his own calibration chart; this is really essential, as the chart supplied with the instrument is practically useless. Mention might also have been made that this meter, although reliable for the determination of natural moisture in wheat, gives very erratic results on conditioned wheat, where added moisture may not have penetrated evenly through the grain.

In this section there is one serious error. The calculation on page 501 on the amount of acid to neutralise 6 oz. bicarbonate is quite incorrect and is based on two errors. The equation given may or may not be the correct one; there are strong arguments in favour of another more complex one. The serious error is, however, the interpretation of the meaning of 80 per cent. A.C.P. This does not mean 80 per cent. pure; it is merely the neutralising value of A.C.P. in terms of bicarbonate, and means that 100 parts acid will neutralise 80 parts of soda, and the answer is

$$\frac{100 \times 6}{80} = 7{\cdot}5 \text{ oz.},$$

and not 8·36 oz. as given.

In concluding this review, which in respect both to the author and its value to the industry has run into some length, one can only emphasise once again its great value to the student who is just beginning his career, to the experienced miller who periodically wants to refresh his memory about certain sections of flour milling that he no longer deals with daily, and also to the teachers who will be in charge of classes of students. It will make their task much easier on account of the vast amount of information collected together in such an orderly manner. One feels sure that the entire milling industry will thank Leslie Smith for his efforts and the results thereof.

The Vitamins

Progress in 1944

F. A. ROBINSON, M.Sc.Tech., LL.B., F.R.I.C.,
Glaxo Laboratories, Ltd.

IN the surveys for 1942 and 1943[1] emphasis was laid on the importance of knowing not only what vitamins are present in different foodstuffs, but also how much of each is present. In spite of the vast literature already available on methods of estimating vitamins in foodstuffs, more and more publications on this subject continue to appear, indicating the importance attached by investigators to the elaboration of trustworthy methods of assay. Such papers constitute the largest section of the literature on each of the vitamins during the twelve months under review. As predicted in last year's report, the vitamin B complex has been the centre of interest and the subject of more publications than all the other vitamins put together. Many of these relate to microbiological methods of assay, a field which is still comparatively new. Several important papers describing the properties and functions of different members of the vitamin B complex have appeared during the year.

Methods of Estimation

The separate estimation of vitamin A and carotene is now recognised to be a matter of some importance, because the biological value of carotene is now known to be much less than that of vitamin A, a point referred to later. Methods of estimating vitamin A and carotene in milk, butter, and margarine have been described,[2] the carotene being estimated colorimetrically and the vitamin A either by means of the ultra-violet absorption of the unsaponifiable matter or by means of the antimony trichloride reaction. One group of workers reported difficulty in obtaining a correlation between the vitamin A and carotene content of butter fats and their biological value; this proved to be due to the presence of other carotenoids which interfered with the estimation of β-carotene. An improved method of carrying out the antimony trichloride reaction has been described,[3] in which a correction is applied for the presence of inhibitors of the reaction. A comparison of the spectrophotometric and antimony trichloride methods for estimating vitamin A in fish oils[4] indicated that the latter method fails to distinguish between oxidised and unoxidised vitamin A. Stress was laid on the importance of using the unsaponifiable matter in such estimations, and it was also pointed out that the U.S.P. reference oil, which has been advocated as a physico-chemical as well as a biological standard, is not reliable for this purpose, as its ultra-violet absorption spectrum is atypical. A new biological test for vitamin A has been proposed,[5] in which the amount of the vitamin, stored in the liver of rats previously depleted, is measured after feeding the animals with the test material on two successive days. The test, which takes only four days, is claimed to be as accurate as the three weeks' curative growth test.

As the result of a collaborative assay[6] it was found that the thiochrome method for estimating vitamin B_1 in conjunction with adsorption on Decalso gave results 20 per cent. higher than the bio-assay. A modification of the thiochrome method has been described,[7] capable of estimating as little as 0·005 μg of aneurine.

Further refinements in the colorimetric estimation of nicotinic acid by means of the well-known cyanogen bromide reaction have been made.[8] A controversy has arisen[9] concerning the nature of the fluorescent substance, "F_2," which is excreted in urine after ingestion of nicotinamide or related compounds, and which is absent from the urine of pellagrins. One group of workers holds that the fluorescence is a property of the excretion product, and another group that the substance actually excreted is the non-fluorescent nicotinamide methochloride; this is said to be converted into a fluorescent substance by the reagents used in its estimation. The matter is of some importance in connection with the metabolism of nicotinic acid.

Vitamin C Estimation

Several papers have appeared on the estimation of vitamin C in presence of interfering impurities. One method[10] depends on the observation that ascorbic acid does not react with dichlorophenolindophenol in 20 per cent. hydrochloric acid, whereas reducible impurities do, thus enabling a correction for the latter to be applied. Another method[11] depends on the oxidation of sulphur dioxide with hydrogen peroxide, followed by direct titration with the dye. Other methods have been published[12] describing the precipitation of impurities prior to titration in order to obtain the true ascorbic acid content. Dehydroascorbic acid can be estimated[13] by stabilising the ascorbic acid present with thiourea and then converting the dehydroascorbic acid into its bis-dinitrophenylhydrazone, which is then estimated colorimetrically. An entirely new type of bio-assay for vitamin C has been published,[14] based on the observation that guinea-pigs on a scorbutogenic diet develop a low serum phosphatase. By measuring the increase in

serum phosphatase following the administration of a preparation containing vitamin C the amount present in the latter can be estimated.

The well-known antimony trichloride reaction for vitamin D has been applied[15] to the assay of pharmaceutical preparations, but there is as yet no satisfactory chemical test for preparations containing both vitamins A and D. It has been reported[16] that cholesterol and various animal and vegetable oils interfere with the polarographic estimation of vitamin E, whilst a modified bio-assay of vitamin E has also been described.

Vitamin Contents of Foodstuffs

Fewer papers than usual have appeared on the vitamin content of foodstuffs. The amounts of ascorbic acid and carotene in a variety of canned fruits and vegetables have been estimated,[17] and, as might be expected, grape-fruit and orange juice proved to be the richest sources of vitamin C (30 to 40 mg. per 100 g.), with asparagus, spinach, and tomatoes somewhat less rich. Carrots and spinach had the highest carotene content (2 mg. per 100 g.); apricots were found to contain somewhat less, and tomatoes, prunes, and peaches contained significant amounts. The vitamin B content of canned foods was also estimated.[18] Of those examined, peas contained most vitamin B_1 and nicotinic acid, whilst asparagus, beans, and tomatoes proved to be rich in nicotinic acid. Tinned fish contained up to 8 mg. per 100 g. of nicotinic acid. Losses of 30 to 90 per cent. of the original vitamin B_1 content resulted from the canning operations. Asparagus, spinach, and tinned fish were rich in riboflavin (up to 0·2 mg. per 100 g.).

A paper was also published[19] on the vitamin B content of honey. This appears to contain all the members of the B complex in significant amounts. Pollen and royal jelly were richer still, and appear to be among the best sources of biotin and pantothenic acid.

Beer has been shown[20] to contain significant quantities of riboflavin, nicotinic acid, and possibly biotin, pantothenic acid, and inositol. Tea, coffee, and cocoa also contain significant amounts of riboflavin, and the contribution made by these different beverages may partly account for the absence of riboflavin deficiency in this country. The amounts of riboflavin and nicotinic acid in barley from Tutankhamen's tomb have been measured;[21] although over 3,000 years old, both vitamins were present. Meat extracts were shown[22] to be rich in riboflavin and nicotinic acid, and corned beef correspondingly deficient. The latter contains only about 20 per cent. of the amounts present in roast beef, some being altogether lost in the pickling process. In other papers[23] results are reported indicating the retention of about 80 per cent. of the original aneurine, riboflavin, nicotinic acid, and pantothenic acid when meat is cooked. Similar retention of vitamin B_1 and a quantitative retention of riboflavin and nicotinic acid is reported in cured hams.

It has been shown[24] that the vitamin C lost during the cooking of dehydrated cabbage is less than with fresh cabbage, and that the use of alkali only results in a loss of the vitamin during cooking when air is present. Milk has been shown[25] to be a good source of pyridoxin; it contains 0·67 mg. per litre. No loss occurs in pasteurising, evaporating, or drying. Riboflavin is rapidly destroyed[26] when bottles of milk are exposed to sunlight, while from 9 to 16 per cent. is lost during pasteurisation, 5 to 8 per cent. on irradiation, and 3 to 5 per cent. during bottling and the brief storage period before delivery.

Human Requirements

Nutritional surveys continue to be carried out, and various attempts have been made to assess the nutritional status of the population under war-time conditions. There appears to be some difference of opinion on the matter, however, largely because different criteria have been chosen for assessing the adequacy of diet. On the whole, however, in spite of rations and the stress of war-time conditions, the nutritional condition of the population is believed to have been well maintained, and it may even be improving. Unfortunately, there still appear to be considerable differences in the nutritional status of various classes of the population, which an apparently uniform system of rationing has failed to eliminate, and in a recent paper it was concluded that poverty was still a very important factor in determining nutritional levels. As a *Lancet* editorial on the subject remarks: "Money may not be the root of all evil, but its absence is the root of much."

A paper has been published[27] on the riboflavin content of food served in R.A.F. messes, which showed that 1·5 to 2·6 mg. were ingested daily, with no obvious onset of riboflavin deficiency. It is therefore concluded that the figure of 3 mg. suggested by the Committee on Food and Nutrition of the National Research Council of America is too high.

A surprising degree of unanimity is reported[28] for the requirement of vitamin C. This is given as 70 mg. per day for adolescent girls, 75 mg. for adult males, and 100 mg. for men and women under twenty-five years of age. The amount of vitamin B_1 required by children is said[29] to be 0·5 mg. per 1,000 calories.

Fat-soluble Vitamins

The effects of vitamin A deficiency continue to be studied, and a description of the latest method of testing R.A.F. personnel for night blindness has been published.[29] It has been shown[30] that vitamin A is useless in the treatment of essential hypertension and that massive doses of vitamin A cause

renal vasodilatation and increased cardiac output. A series of papers has been published[31] on the effect of vitamin E on the utilisation of vitamin A; this was referred to briefly in last year's report. It has been shown that tocopherol enhances the growth-promoting power of vitamin A and carotene on young rats. These results have been confirmed by other workers,[32] who have shown that the utilisation of vitamin A from medicinal preparations or beef liver was quantitative, whilst the utilisation of carotene varied from 33 to 100 per cent. of the theoretical, lettuce being the best source. The poor utilisation was shown not to be due to the presence of inactive carotenoids or to a high carotene excretion, but rather to the vitamin E content of the particular foodstuff. Vitamin E, by protecting carotene and vitamin A against oxidation in the intestine, increases the utilisation of both, and also the excretion of carotene in the fæces.

Some interest continues to be shown in vitamin K, and a group of Russian workers[33] have claimed that phthalic acid is the active substance into which vitamin K and methyl naphthoquinone are converted *in vivo*. This hypothesis has not found favour with others,[34] and the controversy is still unsettled. Vitamin K cures the hæmorrhage caused by dicoumarol[35] and by salicylate.[36] It has been shown[37] that vitamin K deficiency, like vitamin B deficiency, can result from sterilisation of the intestine by sulphonamides.

Vitamins C

In spite of the amount of information now available on vitamin C deficiency and the steps taken to prevent it, numerous reports have appeared of conditions attributable to a deficiency of this vitamin, and a paper was recently published[38] describing fifty-three cases of frank scurvy in this country. Certain types of anæmia are also attributed[39] to vitamin C deficiency, and an attempt has been made[40] to correlate capillary resistance with low plasma ascorbic acid. A series of cases of bleeding gums occurring in R.A.F. personnel responded to vitamin C,[41] whilst Vincent's ulceration also appears to be a symptom of ascorbic acid deficiency.[42]

Vitamin B Complex

The prediction made in last year's review that 1944 would witness considerable activity in this field has been amply justified. The outstanding event is the synthesis of biotin,[43] a remarkable achievement that completes a story, described in more detail in a recent review,[44] which began forty years ago with the observation that various strains of yeast would not grow unless certain extracts were added to the medium. This led to the formulation of the bios theory, which postulated the existence of an essential growth factor produced by living cells. Subsequently it was discovered that several factors were actually present in such extracts, and most of these have now been characterised and synthesised, biotin having proved to be the most intractable of them. It is hoped that as a result of this synthesis larger amounts of biotin will become available for research workers, so that its biological properties can be more thoroughly studied.

Another substance important for the growth of micro-organisms has now been obtained in the pure state.[45] This is folic acid, so called because it was originally isolated from spinach leaves. This was recently shown[46] to inhibit the growth of certain tumours, and it may also prevent agranulocytosis. It has been reported[47] that deficiency of folic acid prevents the response of the oviduct of chicks to stilbœstrol. It is therefore of great importance that more of this material should become available for biological research. Folic acid appears to be closely related chemically and biologically to xanthopterin, the wing-pigment of the brimstone butterfly, which prevents anæmia in fishes, and to the so-called vitamin M, deficiency of which causes anæmia in monkeys.

New Factors

Next in importance is the discovery[48] that a phosphoric acid derivative of pyridoxin (vitamin B_6) functions as a co-enzyme in the decarboxylation of tyrosine. If this observation is confirmed, pyridoxin will come to be recognised as yet another of the members of the vitamin B complex that functions as the essential group of a co-enzyme.

Another new factor, mentioned in last year's report, which seems likely to become of great importance is vitamin B_c,[49] the absence of which causes anæmia in chicks. It is apparently identical[50] with Stokstad's *L. casei* factor and, like folic acid, resembles xanthopterin. Several new factors not yet characterised have been claimed to be necessary for dogs,[51] chicks,[52] and micro-organisms.[53]

Interest continues to be shown in the preparation of growth inhibitors related to various members of the vitamin B complex. Attempts have been made[54] to prepare additional anti-bacterial analogues of pantothenic acid. Three different substances have been shown to be antagonistic to aneurine, but have, unfortunately, been given the same name—"pyrithiamine";[55] this will undoubtedly lead to confusion in the future. Antagonists to riboflavin[56] and biotin[57] have also been prepared. Unfortunately, none of these has yet been shown to be of value in medicine.

Bacterial Synthesis

An observation of great theoretical and practical importance, to which reference was made in last year's report, has now received further confirma-

tion. It appears[58] that in many animals, and possibly in man, part at least of their vitamin B requirements are obtained from bacteria growing in the intestine. When bacteria are killed or their growth inhibited, as during treatment by certain sulphonamide drugs, or through absence of one essential growth factor, a multiple vitamin deficiency may result.

This observation has an obvious bearing on the validity of the vitamin concept, since, by definition, vitamins are substances which can only be obtained from the diet. The fact that some of them may be synthesised within the body, although not by the body cells themselves, means that the figures, obtained with so much labour, for the human requirements of certain vitamins may be quite meaningless, being invalidated by the contribution made by the intestinal flora. How capricious this output is is not yet known, but the problem obviously demands careful attention and a considerable amount of investigation. Doubtless much will be written on this subject during 1945.

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(*Continued on page* 104)

Food Analysis

Progress in 1944 **PART II** D. W. GROVER, B.Sc., F.R.I.C.

CONSIDERABLE attention is being given in the United States to the measurement of colour and turbidity of **beer and wort.** Two approaches are made to the problem, one aiming at refinements of normal comparisons, and the other at the use of modern photometric apparatus.

The customary Lovibond glasses have been found to be unreliable as regards their light absorption, particularly the smaller, numbers.[41] No more satisfactory substitute has been recommended, however, the use of coloured liquids such as solutions of iodine or dyestuffs presenting serious obstacles for routine work. As regards turbidity, Pear's white precipitated fuller's earth suspended in water is considered to give a satisfactory standard.

Using an electrophotometer and suitable light filters, extinction coefficients can be measured for white light (absorption due to colour and turbidity) and for red light (absorption due to turbidity), giving figures which, suitably corrected, enable colour and turbidity values to be calculated.[42] Alternatively, the photometer may be employed to measure transmitted and dispersed light.[43]

The rapid A.O.A.C. method for the determination of **resin in hops** gives low results for samples containing abnormally low or high resin contents. This error was pointed out by Ford and Tait in 1932, and means for avoiding it have recently been studied.[44] Lead acetate in methyl alcohol, used as a precipitant, redissolves some of the resin if present in too great an excess, whereas insufficient excess leads to incomplete precipitation.

Bishop and Whitely[45] have described in detail methods for the determination of the **attenuation limit of worts.** These involve (i) fermentation in the presence of added nutrients, (ii) fermentation without added nutrients, and (iii) fermentation with non-flocculating yeast washed with wort. The experimental basis of this method and the calculation of fermentability are discussed.

Of the analytical characteristics proposed from time to time for the **differentiation of different kinds of vinegars,** O'Neill and Henry find the most useful to be the permanganate oxidation numbers of the volatile and non-volatile fractions.[46] Standardisation of rate of distillation, reagents, time of reaction; etc., is necessary if consistent figures are to be obtained. Distilled vinegars give figures of 3 and over for the volatile fraction, whereas diluted acetic acid gives a figure less than 0·3.

S.R. & O. 1944, No. 46, lays down limits for available and **residual carbon dioxide in baking powders** (8 per cent. and 1·5 per cent. respectively) and golden raising powders (6 per cent. and 1·5 per cent. respectively). Directions are given in the Order for treatment with water prior to determining the residual CO_2. Two gr. of the sample are twice treated with 25 ml. of water and evaporated to dryness. Unless some standard procedure such as this is followed, variable amounts of CO_2 are retained by the glutinous mixture. The residual CO_2 is evolved by the action of dilute sulphuric acid. Boundy and Morris[47] have developed an alternative treatment, more suitable for routine analysis, which gives good agreement with the above official method. It consists of refluxing under standardised conditions in sodium chloride solution, followed by acidification and distillation. Slightly more CO_2 is retained, but agreement is satisfactory except for powders which greatly exceed the statutory minimum of 1·5 per cent. residual CO_2.

Revised standard methods for **sampling and testing gelatines** have been published by the British Standards Institution. These include physical tests, arsenic, sulphur dioxide, etc., and follow well-established lines.[48] Spot tests for establishing the origin of gelatin, based upon colour reactions, have been described by Steigmann.[49]

A new method for determining the **starch in mayonnaise** involves refluxing with 30 per cent. calcium chloride solution, centrifuging, and precipitating an aliquot with 70 per cent. alcohol. The crude starch so obtained is purified by converting to the starch-iodine complex, which is reconverted to starch with alcoholic soda and finally estimated as dextrose after hydrolysis with acid.[50]

A fairly rapid determination of the **total fat in foods,** which agrees well with standard methods and is suitable for bakery products, soup powders, etc., has been described by Grossfeld and Schroeder.[78] Five gr. of the finely divided air-dried sample are extracted for thirty minutes with 30 ml. of a 1:1 alcohol/benzene mixture. The solvent is evaporated and the residue shaken with 10 ml. of water and 50 ml. of petrol (60° to 70°). After standing overnight the fat is determined on an aliquot.

Flavours, Colours and Preservatives

Modified **tests for vanillin, saccharin, and dulcin** have been developed by Continental workers.[51, 52] Analytical details are described in *Chemical Abstracts.* One test for saccharin is

based upon a violet coloration produced with hydrogen peroxide, copper sulphate, and sodium nitrate. Dulcin is extracted with mixed ethers and identified as its nitrate. Vanillin, refluxed with phosphotungstic or phosphomolybdic reagent, gives a violet colour on treating with excess soda.

Some difficulty may be experienced in **separating sudan red and related dyestuffs from foods** containing a large quantity of fat. One way is to extract the fat and colour together, saponify the former, extract with alcohol, pour into water, and dye the resulting colloidal suspension on to wool.[53] A large amount of unsaponifiable matter interferes with this test. A rather simpler procedure which is not interfered with in this way is to shake some of the material in a cylinder with either alumina, calcium carbonate, or kaolin and an excess of lead acetate solution. The dye is adsorbed and may readily be washed out and identified.[54]

A modified method for the separation and identification of **tartrazine** has been described during the year.[55]

A study of the Bennett and Donovan method for direct **determination of sulphur dioxide** in citrus juices (described in the *Analyst*, 1943) has confirmed its general accuracy.[56] Slight modifications are suggested, particular attention having been given to such matters as time of reaction with alkali, *p*H for reaction with acetone, etc. The use of the dropping mercury electrode for the direct determination of sulphur dioxide is also investigated.

Sulphur dioxide is usually added to **gelatin stock** to improve the colour of the finished article and to act as a preservative during drying. As a limit of 1,000 parts per million is imposed on edible gelatin, the determination of this preservative is of obvious importance. Francis and Pilgrim[57] describe a rapid steam distillation method. The unsoaked gelatin is distilled from dilute sulphuric acid into neutral hydrogen peroxide, which is subsequently titrated with standard sodium hydroxide solution, using a mixed indicator (1 gr. methyl orange and 1·4 gr. xylene cyanol FF dissolved in 500 ml. of 50 per cent. alcohol). Alternatively, the sulphur dioxide may be distilled from dilute hydrochloric acid into N/20 iodine solution.

Considerable attention is being given to the **detection of monochloracetic and monobromacetic acids in beverages.** In general these acids are extracted from the acidified sample with ether, followed by purification with aqueous soda solution or by sublimation. Monochloracetic may be identified as the barium salt, using crystallographic data.[58] Alternatively, both acids may be recognised by the typical needle- and pear-shaped crystals formed with mercuric nitrate solution.[59] Bromacetic acid yields a characteristic colour reaction when its sodium salt is fused with *o*-phenylenediamine.[60]

Recent literature dealing with the **determination of trace elements** is principally confined to refinements of previously described methods. In the **estimation of calcium** the oxalate may be titrated cold with ceric sulphate if manganous sulphate is present as catalyst, ferroin being used as indicator.[61] Pyne[62] describes an improved micromethod for the estimation of calcium and magnesium in milk, separating these metals respectively as oxalate and ammonium phosphate. A further instalment of "The Bibliography of Metals in Food," dealing this time with **thallium,** has been published in the *Analyst*.[63] A modification of the Gutzeit test for **arsenic,** capable of determining extremely small traces of this element, departs from the original method in several particulars.[64] The evolution of arsine takes place under vacuum, and the sensitised paper is arranged to give a uniform stain which is compared with a mathematically graded photographic step scale. The apparatus consists principally of machined parts made from methacrylate polymer. The paper describing this procedure includes a useful bibliography.

Proposed modifications in the **determination of phosphorus** include the use of molybdenum as a catalyst during the destruction of organic matter with sulphuric and persulphuric acids,[65] and improvements in the spectrophotometric estimation as molybdivanadophosphoric acid.[66]

Two reports have been published dealing with the **determination of fluorine** by means of its bleaching effect on thorium-alizarin lake (Willard and Carr, 1933). One comprises a detailed review of the various modifications of this method which have been proposed during the last ten years.[67] The other,[68] a report of a sub-committee of the Analytical Methods Committee of the Society of Public Analysts, gives detailed instructions for making this determination. The method comprises ashing in the presence of excess calcium carbonate, followed by steam distillation from perchloric acid as hydrofluosilicic acid. Alizarin-S was found to be the most reliable indicator for the final determination. Great care is needed to ensure the purity of the reagents used, and conformity with the procedure described is essential if exact results are to be obtained.

For the determination of **traces of iron,** further experience with the $\alpha\alpha$-dipyridyl method[69] and Bradbury and Edward's mercurous nitrate titrimetric method[70] confirms their usefulness in the analysis of biological material.

Addendum—Fruit and Vegetables

The Panel of Chemists of the Citrus Juices Control in this country have developed reliable and reproducible methods for determining the degree of concentration of concentrated citrus juices, based upon the measurement of the refractive index of undiluted juice or the specific gravity of the juice diluted sufficiently to allow entrained bubbles to escape.[71]

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Fruit Tablets

A DESCRIPTION of the preparation of what he has christened "Fruit Tablets" has been given by Dr. W. V. Cruess, in *The Manufacturing Confectioner* (August, 1944). The confection is the result of three years' experimentation on the use of powdered dried fruits, which have also been found of use in several standard confectionery formulæ.

One simple method of preparing the tablets consists in mixing a commercially prepared powdered fruit, such as powdered apricots, prunes, peaches, or figs, with about an equal weight of dextrose (more or less than this amount can be used), and compressing into tablets similar to old-style peppermints in size and shape. A laboratory size Carver press was used for compressing the mixture into circular tablets about ¾ to 1 inch in diameter and about 3/16 to ¼ inch in thickness. About 1,000 pounds per square inch pressure gave fairly good texture. If pressure is too low, the tablet is crumbly; if too high, the tablet becomes too hard.

In commercial production existing factory equipment could probably be used.

Another method of preparing the tablets consisted in mixing a small amount of fruit concentrate (syrup) with the dextrose and powdered fruit before compressing.

Another convenient method consisted in mixing dried fruit with an equal weight (or more or less) of dextrose by grinding, then compressing into tablets. Or by mixing steam a short time to cause thorough blending of sugar and fruit, drying or allowing to harden; on cooling, grinding and compressing into tablets.

Another procedure consisted in cooking the fresh fruit with dextrose or cane sugar, drying, grinding, and compressing.

Still another method consisted in concentrating fruit juices to syrupy consistency by suitable means (as in vacuum pan, etc.), adding one to three parts of dextrose (preferably anhydrous), standing until crystallised and solid, grinding and compressing.

It was found possible to make quite satisfactory tablets by just preparing a fondant with cane sugar and corn syrup or invert syrup, and, while it is still fluid and warm, mixing with it a considerable proportion of powdered fruit. If sufficiently fluid (fondant high in invert or corn syrup, or cooked to low fondant stage) the mixture may be cast in starch in usual manner. The fruit provides colour and flavour.

In other words, fruit tablets may be made in a number of ways, the finished products differing from each other considerably in texture and edibility. They could provide variety in mixed candies and candies of special nutritive value.

War-time and Post-war Sausages

AT the Smithfield Institute recently Mr. Frank Gerrard gave a lecture demonstration on "Control and the Post-War Sausage."

It was pointed out that from the aspect of texture and keeping properties the most important constituent of sausage is water, and accurate control of this ingredient was essential to produce a satisfactory article. Lean beef muscle could be considered as containing about 75 per cent. of water, but as the fat increases there is a proportionate decrease in the water content, as the beef fat contains only about 15 per cent. of water. It is thus obvious that brisket meat, containing, say, 36 per cent. of fat, would produce an entirely different product as compared with clod and sticking, having about 18 per cent. of fat and yielding a markedly different water content. This stresses the need of separating the meat and fat to maintain a consistent ratio. There is more control with rusk, as it can be assumed that it contains about 5 per cent. of water, and the desired addition can be controlled.

Representative figures were given for manufacturing meats illustrating the percentage variation of water, protein, fat and bone content, and methods of costing suggested.

The following recipe for a typical war-time beef sausage (37½ per cent. meat) was elaborated and discussed:

	Weight.	Per Cent. (approx.)
Beef meat (30% fat)	7½ lb.	37½
Soya grit	1½ ,,	7½
Dry rusk	3 ,,	15
Water (¾ gal.)	7½ ,,	37½
Seasoning approx.	6 oz.	2
Approx.	20 lb. chopping.	

Stock Seasoning.			
Salt	1 lb.	0	oz.
G. W. pepper	4	oz.	
G. nutmeg	1	oz.	
G. ginger	1	oz.	
G. sage	1	oz.	

An analysis of such a sausage would probably give: 57 per cent. of water, 11·5 per cent. of protein, 13 per cent. fat, 13 per cent. carbohydrate. There would also be small amounts of calcium and iron, with a useful quantity of vitamin B_1, and the calorific value would be in the region of 1,000 calories per lb.

To prepare a pork sausage to comply with the present Regulations, the following recipe was offered:

	Weight.	Per Cent. (approx.)
Lean pork	7 lb.	
Back fat	3 ,,	49
Dry Rusk	3 ,,	15
Soya grits	1 ,,	5
Water	6 ,,	29
Seasoning approx.	6 oz.	2

Stock Seasoning.			
Salt	1 lb.	4	oz.
G. W. pepper	4	oz.	
G. mace	4	oz.	
G. ginger	2	oz.	
G. sage	1	oz.	

The method of manufacture is as follows:

The soya grit and dry rusk are mixed and added to the water. The lean meat is placed in a bowl chopper, the machine started, the seasoning added, followed by the soaked binder and finally the cubed back fat. Chopping is continued to give a fairly fine texture, as preferred for the London trade, and the meat filled into hog casings.

Under normal storage conditions there would be a slight loss of weight owing to evaporation, and this would slightly increase the other percentages.

As regards the post-war sausage, it appears possible and desirable that some minimum legal standard should be maintained, and it was decided that some experimental work on a high-grade pork sausage, involving the use of eggs and milk, should be undertaken later.

Food Adulteration during the War

In the course of a Chadwick Lecture given on December 12, Dr. George H. Walker, Public Analyst for the City of Salford, said that interest in food adulteration was first aroused by Dr. Hassall and his collaborators in the year 1851. The appointment of public analysts was made compulsory on the passing of the Sale of Food and Drugs Act, 1875. At the beginning of the war a completely new Act, the Food and Drugs Act, 1938, had just come into force, but, owing to the Ministry of Food taking over most matters relating to food, it has not yet been fully operated, particularly Section 8 relating to composition, etc., of food, by the Ministry of Health.

Milk has been in short supply during the war, yet there has been no noticeable increase in its adulteration: Naturally poor quality milks show a tendency to increase. The lecturer stressed the advisability of an absolute standard of chemical quality for milk intended for the liquid milk trade.

The war year 1941 was outstanding for the number of food substitutes, many worthless, which were offered for sale. Substitutes appeared for milk, eggs, oranges, lemons, onions, sugar, etc. Food and Drugs Authorities throughout the country instituted numerous successful prosecutions, and central action was taken by the Minister of Food, who made the Food Substitutes (Control) Order in October, 1941.

Some samples of the following commodities have also been adversely commented upon by public analysts during the war period: Gelatine containing excessive quantities of arsenic, zinc and other chemical impurities. "Tonic beverages" with practically no tonic properties. White mustard sold as mustard for table purposes. Refined mineral oil used in the place of vegetable or animal oils in confectionery and in salad oils. Gravy browning or colouring made with unsatisfactory artificial colours instead of caramel. Baking ingredients containing fluorides.

Approximately 500 Regulations of the Ministry of Food are at present in force relating to some 100 commodities or classes of commodity. They relate to control generally (*i.e.*, price, manufacture, etc.), but many contain provisions as to composition. Examples include Regulations concerning jam, soft drinks, meat products, flour confectionery, etc. The policy of extending the control of composition and labelling to foods generally has recently been implemented by the making of the Defence (Sale of Food) Regulations, 1943; the Food Standards Orders, 1944, and the Labelling of Food Order, 1944.

The Vitamins

(*Continued from page* 100)

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Trade News

British Pea Production

British canning firms and the National Farmers' Union, who plan to make this country self-supporting in peas after the war, have set up a joint council to encourage farmers to increase their acreage this year and make the next harvest Britain's greatest. The council has set up a research committee to improve the quality of seed.

Before the war the Japanese sent us millions of pounds' worth of peas, while British growers failed to find buyers even at lower prices.

* * *

Hercules Forms an English Company

The Hercules Powder Company of Wilmington, Del., announce the creation of a subsidiary company, the Hercules Powder Co., Ltd., for the distribution of technical information on their chemical products in Great Britain and Eire. The company will be under the direction of Mr. Cornelius H. B. Rutteman, managing director. Directors are: Thomas H. Cooke, manager of Holden Vale Manufacturing Co., a partly owned subsidiary of Hercules; R. H. Oxley, manager of the London branch of the Bankers Trust Co. of New York; and Kenneth D. Cole, solicitor.

Hercules have been selling chemicals in Great Britain for twenty-five years, and throughout that period their technical representatives have been assisting distributors and customers in the utilisation of these chemicals. Mr. Rutteman has been the company's resident representative in London since 1939.

The London office will administer the company's English business and assist customers and local distributors with data and technical service on the use of Hercules products. These include cellulose derivatives for lacquers and plastics, terpene and rosin chemicals, synthetic resins for the production of coatings and for other industries, and paper makers' chemicals.

Crop Drying Exhibition in London

The truth of the statement that British agriculture is one of the most highly mechanised in the world was demonstrated by a visit to the Exhibition of the crop drying and storing machinery held at the Royal Horticultural Hall in London.

Before the advent of the combine harvester it was usual for the grain to be cut with a self-binder and then stooked, carted and made into stacks. From these stacks it was threshed as required, usually by a travelling thresher and gang, and was marketed in fairly regular quantities throughout the year.

During the past few years the combine harvester, which delivers threshed grain as it cuts the corn, has been gaining in popularity in many parts of the country, due to the time and labour it saves. Side by side with this modern development has been the growing use of grain driers, for normal climatic conditions in this country at harvest time often necessitate artificial drying of the grain if it is not to deteriorate when stored. But that is not the whole story. The drying process must carefully follow the established rules, otherwise damage can be caused to the food properties of grain roughly dried. Having been dried to the correct degree of moisture content, the grain must be properly stored to maintain it in good condition.

That agricultural engineers and manufacturers have the importance of these considerations fully in mind was borne out by the wide variety of driers and storage bins, which were demonstrated at the Exhibition by means of working models.

The increasing attention being given to conserving grass for winter keep lent special interest to the working models of grass driers that were staged. Grass is one of our principal crops, and while hay-making is still the established process for storing for the winter, the modern method of drying young grass preserves its valuable feeding properties when the dried product is stored.

Hints to Business Men

As announced in the House of Commons, copies are now available of the first of the booklets in the *Hints to Business Men* series.

These have been prepared by the Department of Overseas Trade. The booklets already available cover the U.S.A., New Zealand and British East Africa. Copies can be obtained free of charge from the Department of Overseas Trade, Hawkins House, Dolphin Square, S.W. 1.

These booklets include basic information required by business men about markets, such as notes on population, currency, usual methods of payment, sales organisation and customs formalities, as well as hints about travel and accommodation. The series will ultimately cover all overseas markets.

In a number of cases similar brochures were issued by the Department of Overseas Trade before the war, but the new series will include a number of markets not previously covered.

* * *

James Clayton Young

British advertising has suffered a great loss by the sudden death of James Clayton Young, advertising manager of Ford Motor Co., Ltd.

Clayton Young joined the Ford organisation on March 1, 1943, from Willys Overland Crossley, Ltd., Heaton Chapel. Soon after the outbreak of war he was seconded to the Ministry of Food, where he organised the Public Relations Department of that Ministry. Upon his return, he organised the Ford Emergency Food Vans Trust under the direction of Lord Perry.

As recently as November last he flew to Sweden to represent British advertising at the Swedish Advertising Union Twenty Years Jubilee Celebrations.

Clayton Young was a great organiser and worker, having fresh and novel ideas, who never spared himself in the cause of advertising. He was 46 years of age, and leaves a widow and two children.

Small Vertical Boilers

Inexpertly or carelessly handled, the small vertical boiler can be a particularly heavy fuel-waster; some hold the view that it is perhaps the most inefficient steam-raising unit in use.

The first cost of this type of boiler generally is low. It is, too, a very convenient unit to operate. These are reasons for its wide popularity: but at the same time they are in all probability two of the reasons why such boilers often receive scant attention.

The efficiency of the general run of these boilers cannot be much above 50 per cent. A 40 per cent. efficiency seems common, although there are improved forms, with a greater ratio of heating surface to grate area, which make it easier to obtain higher efficiencies.

Although the fuel consumption of a single vertical boiler may be comparatively small, as the type is in such wide use the aggregate fuel consumption must be considerable. Even so, a single unit can show a substantial saving. If, for example, we have a vertical boiler generating 600 lb. of steam an hour over a 48-hour week, and operating at 40 per cent. efficiency, the coal used during the year will amount to about 150 tons (not counting the extra fuel used for daily lighting up). It is quite reasonable to suppose that this figure can be brought down to about 120 tons (with a financial saving of at least £60 a year) by adopting certain common-sense suggestions.

These suggestions are set out in a 10-page booklet just issued by the Ministry of Fuel and Power (No. 37 in the series of Fuel Efficiency Bulletins).

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Major R. N. Wright

Major R. N. Wright, B.Sc., A.R.C.S., has been appointed a director of Crosse and Blackwell, Ltd., with which company he has been associated for over twenty years.

Mr. Wright was a member of the original committee (January, 1932) of the Food Group of the Society of Chemical Industry.

He is a member of the executive council of the Diabetic Association and has done pioneer work in connection with the publication of booklets giving carbohydrate, fat and protein values of foods suitable for diabetic patients.

He now becomes director and chief factory manager of the Crosse and Blackwell combine, including E. Lazenby and Son, Ltd., James Keiller and Son, Ltd., Chef Products, Ltd., Chocolat Tobler, Alexander Cairns and Co., Ltd., Plaistowe and Co., Ltd., etc.

Major Wright is commanding officer of the Kent Cadet Regiment, Royal Artillery, which is established in the Beckenham area.

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Dr. J. G. Davis

Recently appointed scientific adviser, chief chemist and bacteriologist to the Express Dairy Co., Ltd., Dr. J. G. Davis, still a young man, has already had a distinguished career.

From 1922 to 1927 he studied at University College, London, taking his B.Sc. in chemistry and physics in 1925.

M.Sc. (biochemistry) in 1927, he was research assistant at the National Institute for Research in Dairying, under an Empire Marketing Board grant.

In 1930 he was appointed to the permanent staff of the Institute, and also organised the first course of lectures and practical work in Dairy Science at Chelsea Polytechnic.

Davis obtained his Ph.D. in physiology in 1931 and the year after joined the staff of Reading University. He also held the Rockefeller Research Fellowship at Kaiser Wilhelm Institute for Medical Research, Heidelberg. In 1938 he was head of the Bacterial Metabolism Section at the National Institute for Research in Dairying.

From 1940 to 1941 he took his D.Sc. in bacteriology and organised and directed the mobile laboratory at the Institute. He also assisted in organising the Ministry of Food experimental milk testing scheme and, later, the National Milk Testing and Advisory Schemes.

Davis has served on the committees of the Biochemical Society, Society of Dairy Technology, Society of Agricultural Bacteriologists, and on the technical committees of the Ministry of Agriculture and the British Standards Institution. His scientific work has been chiefly on cheese bacteriology and ripening, lactic acid bacteria, bacteriological media, mastitis, milk testing, especially the resazurin tests and, lately, rapid electrical analytical methods for the dairy and allied industries.

* * *

Assistance to Ex-Servicemen

Trades associations have recently displayed great interest in the future of ex-servicemen and women who wish to start businesses of their own after the war. In particular they have been keeping a careful watch on the activities of speculators now buying up small businesses in the hope of profiteering as soon as the war is over.

The latest association to offer assistance to ex-servicemen wishing to set up in business is the National Federation of Grocers and Provisions Dealers.

The Confectionery Trade Council has already issued details of the advice which it is prepared to give not only to ex-servicemen and women but also to their dependents and others returning from the various branches of National Service. Advisory panels have been formed in forty-five districts in England, Wales and Northern Ireland; and the British Legion has been asked to provide information of cases which come within the scope of the trade.

The North-Western Council of Chambers of Trade and Commerce and Associations, which covers a large area in Cumberland and Westmorland, is another body which plans to work on similar lines in conjunction with the British Legion.

Company Meetings

Allied Bakeries

The annual meeting of Allied Bakeries, Ltd., was held on January 17, in London.

Mr. W. Garfield Weston, M.P., the chairman, said that in the fifth year under war conditions their trading subsidiaries had maintained their output and sales, but the continuance of the restrictions on ingredients and deliveries had made impossible any great progress. In the balance sheet investments in subsidiary companies had increased by £167,443 without any increase in issued capital. A new item of £175,000 appeared in respect of tax reserve certificates. There was a decrease of £83,476 in amounts due to vendors in respect of acquisition of shares.

They had in mind the need to provide for post-war requirements of plant, buildings, etc., and for the extension of activities by provision of new bakeries and had appropriated £50,000 to general reserve, which now stood at £150,000. Fixed assets at £3,011,511 were £35,443 higher after writing off depreciation. The cash balance now stood at £481,206. Total of cash and tax reserve certificates, £1,060,406, was greater by £46,799.

The total addition to reserves was £147,455. With the exception of a few minor shareholdings the company owned the entire Ordinary shares in every one of their operating companies and that, of course, made for greater ease of control and for rationalisation of inter-company relations. The total liquid assets at £2,363,987 exceeded current liabilities by £351,748, compared with £356,708 last year. That must be considered satisfactory, especially as considerable outlays had been made in investments and on capital account without any increase in the amount of issued share capital.

The board was fully alive to the need for scientific progress in their factories, and a scheme was in course of preparation with a view to the provision of a first-class laboratory as soon as conditions permitted. Their aim was to augment their present staff with the ablest chemists they could find and to fit out their new laboratory with the most up-to-date scientific and research equipment obtainable, so that it would be among the finest in the baking industry.

He could not conclude without paying tribute to the directors, executives and all the employees of the subsidiary operating companies for their continued wholehearted co-operation, loyalty and support during the past year, without whose splendid efforts the satisfactory results placed before the shareholders would not have been possible.

The report was adopted.

* * *

British Sugar Corporation

At the eighth annual general meeting of British Sugar Corporation, presided over by Lt.-Col. Sir Francis Humphrys, Government director, the chairman stated:

Your directors have already declared an interim dividend of 4½ per cent., less income-tax, absorbing £112,500. They recommend that no further dividend be paid and that the balance of £34,626 be carried forward.

The sugar beet crop is continuing to play a highly important part in British agriculture, particularly in those arable areas where the crop has become firmly established as the pivot of the farming rotation. It is no exaggeration to say that hundreds of thousands of acres of land are at the present time being maintained in a high state of fertility as a direct result of growing sugar beet. The by-products, pulp, crowns and leaves—amounting in 1943-44 to more than four million tons—made an invaluable contribution to the maintenance of the livestock industry in this country.

The yield of beet per acre was once again above the pre-war average, and farmers and workers are to be heartily congratulated on the successful harvesting of so large a crop.

Foster Clark, Ltd.

In face of the stringent wartime restrictions, Foster Clark has done well to achieve a trading profit for the year to September 13 of £62,736, against £63,620 in the preceding year. With a final dividend of 12½ per cent. the ordinary dividend is again brought up to 20 per cent. In his statement Mr. Henry C. Clark warns stockholders that for the first three months of the current financial year there has been some falling off in sales and that future costs are more likely to rise than fall. The indications are, therefore, that there will be some decrease in profit. Fortunately, however, this company's financial position is immensely strong, total reserves amounting to £370,916, of which £129,252 consists of dividend equalisation reserve and carry-forward.

* * *

Fillery's Toffees

Sir Herbert E. Morgan, who presided at the annual general meeting of Fillery's Toffees, made the important point that the present trend of legislation suggested that products such as Fillery's Toffees should be in steady demand. He did, however, make another and not less important point—namely, that in order to provide the revenue for social security and like measures it would be necessary to tackle the problems of the export trade forcibly and without unnecessary delay. The company, in this its tenth year of existence, holds a strong position in the confectionery trade. Good profits were earned in the year under review, and a dividend of 10 per cent. is being paid for the third year in succession.

Fruit and Produce

Information on the technical progress made in the fruit-growing industry was given recently by Mr. P. Pask at a meeting of the Fruit and Produce Exchange of Great Britain. In this progress the company has played its part through a home-grown fruit-growing subsidiary.

News from the Ministries

Questionnaires to Bakery Firms

The Ministry of Food has sent letters to 1,300 bakery firms enquiring about ovens and machines needed to replace worn-out plant in the early post-war period. It is hoped that the replies will give a representative cross-section of the trade's immediate requirements on which an estimate of total needs can be based. Bakers who receive forms should, therefore, return them promptly. This is only a sample enquiry and the filling in of a form does not in any way commit the baker or the Ministry. Bakers asked for this information will not be placed in any more favourable position for obtaining plant than those who do not receive a form. Further, it may be a considerable time before the replacement programme can be completed.

* * *

The Flour Order, 1945.

An Order, entitled as above, has been made by the Minister of Food, which came into force on Sunday, January 28, 1945. This Order is mainly a consolidating Order, but one or two new points are introduced. In particular, on a retail sale of flour, if the retail price includes a fraction of a farthing, the retailer will be able, in the new Order, to charge this as a farthing instead of having to ignore it as in the 1944 Order. Slight increases are made in the charge for flour packed by flour millers in 6- and 12-lb. bags, and such packers are, under the Order, permitted to make a reasonable deposit charge when selling flour in returnable outer containers other than bags. The main provisions of the Acquisition of Food (Excessive Quantities) Order, 1942, in so far as they relate to flour, are repeated in this consolidating Order. Another alteration is that which limits the proportion of imported flour permitted to be included in batch bread in Scotland to 12½ per cent. of the total flour content.

Copies of the Order, S.R. & O. 1945, No. 1, may be obtained from H.M. Stationery Office at the usual addresses.

Soya in Pork Sausages

The Minister of Food has made an Order (S.R. & O. 1945 No. 109) amending the Meat Products Canned Soup and Canned Meat (Control and Maximum Prices) Order, 1944, S.R. & O. 1944 No. 763 as amended. The new Order prohibits the use of soya and even low fat soya in the manufacture of pork sausages and pork sausage meat (including pork slicing sausage). No change is made in the soya content of beef sausages and beef sausage meat (including beef slicing sausage).

To give time for the disposal of existing stocks the new Order allows the use of soya in the manufacture of pork sausages and pork sausage meat, including pork slicing sausage, up to March 31, 1945, and sale of pork sausages and pork sausage meat, etc., containing soya, is permitted up to April 7, 1945.

The new Order came into effect on February 4, 1945.

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Orange Juice Jelly

The Ministry of Food announces that arrangements have been made in consultation with the Education Departments for the supply of orange juice jelly to school canteens, day schools, boarding schools and orphanages which are licensed as catering establishments or institutions. War-time nurseries and nursery schools will not receive supplies of the jelly, since they are able to obtain concentrated orange juice in bottles for young children attending them. The orange juice jelly is made from concentrated orange juice and is a valuable source of vitamin C.

Establishments eligible to obtain orange juice jelly will shortly receive from their local Food Offices a leaflet giving full details of the procedure for obtaining supplies and particulars of the quantities which they will be authorised to obtain. The Education Departments are issuing to schools a leaflet containing recipes for using the jelly, which should provide an attractive addition to their menus.

Brazil Nuts

The War Food Administration of the U.S.A., the Canadian Government and the Ministry of Food of the United Kingdom announce that the U.S.A., Canada and the United Kingdom plan to continue preventing the importation of Brazil nuts during 1945 in order to avoid diversion of workers from the more essential rubber production in Brazil.

* * *

Drying of Vegetables Order

The Minister of Food has made an Order, S.R. & O. No. 132 of 1945, which amends the Drying of Vegetables (Licensing and Control) Order, 1941.

The Order removes the drying of herbs and the drying of tomatoes from the scheme of control imposed by the original Order, and manufacturers of dried herbs and dried tomatoes may now operate without a licence from the Ministry of Food.

* * *

The Sale of Corn

In December, 1942, the Ministry of Agriculture issued a comprehensive booklet under the title of *A Farmer's Guide to the Sale of Corn*, the purpose of which was to explain to growers and others connected with the food production campaign the arrangements made for the production, marketing and use of corn crops, and the purpose of the various Orders relating to such crops. A revised and up-to-date version has now been published which summarises the provisions of the Orders in force on December 1, 1944. Included in the booklet is a short section on grain drying.

The *Guide* is a reference book and is designed so that it should be possible to see at a glance the arrangements governing the use and disposal of any corn crop, and farmers may find it useful to keep a copy by them. The booklet may be obtained free of charge on application to the Ministry of Agriculture, Africa House, Kingsway, London, W.C. 1.

Meals in Establishments Order

The Meals in Establishments Order prohibits the service of main dishes containing more than one of the following specified foods: Meat (including bacon, game and poultry), fish and egg. Originally egg was defined as including both shell and dried egg. Subsequently the definition was limited to shell egg. In the result, the service of bacon and shell egg, though not bacon and dried egg, remained prohibited. In order to remove this anomaly, the Minister of Food has now made an Order, S.R. & O. No. 101 of 1945, amending the Meals in Establishments Order by deleting egg from the list of specified foods.

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Divisional and Local Organisation

The Minister has learned with regret of the death on February 2, 1945, of Major W. Lloyd Griffith, M.B.E., J.P., who served as Divisional Food Officer for North Wales.

The Minister wishes to place on record his appreciation of the valuable services which Major Lloyd Griffith rendered to the Ministry during the present war, and also during a considerable period prior to 1939 when he assisted the Food (Defence Plans) Department of the Board of Trade. Major Lloyd Griffith also served in the Ministry of Food of the last war.

* * *

U.S.A. Pork Trimmings for Manufacturing

The Ministry of Food announces that, as a temporary measure, manufacturers (including general butchers) who receive U.S.A. pork trimmings as part of their allocations of manufacturing meat may, from January 22, 1945, order an additional quantity of these trimmings up to 25 per cent. of the amount of their total allocation of manufacturing meat. Such issues will be additional to the current allocation of manufacturing meat. Pork trimmings issued under this arrangement are to be used only to meet immediate manufacturing requirements and must not be stored by manufacturers.

OBITER DICTA

- Eel fillets, even from the unattractive creatures taken from Scottish lochs and rivers, can be delicious.—*Evening Citizen, Glasgow.*
- Enough butter has been stolen from one M. of F. store on Tyneside in the past few months to provide weekly rations for 114,000 people.—*News Review.*
- Dumbarton Oaks is a grim hoax. No nation to-day trusts the other nations sufficiently to warrant a single gesture towards risking its security on the success of an international organisation.—*Senator Wheeler.*
- Whatever criticisms one may make of the Ministries of Food and Supply, it must be admitted that the scarcity of fish and potatoes has synchronised perfectly with the shortage of newsprint.—*Punch.*
- Our aim is to abolish preservatives of every description so as to ensure that foods are sold fresh: but where some preservatives must be used, the one to which there is least objection is sulphur dioxide.—*Lancet.*
- The main cause of the outbreaks of foot-and-mouth disease was diseased meat brought into this country for human consumption. It was monstrous that people should be asked to eat it.—*Earl Winterton, in the House of Commons.*
- Even if expenses remain nearly as high as they are now, I shall still be able to provide the public with apples at quite a reasonable price provided I am not forced to spend a lot of money on elaborate grading and packng.—*Mr. Bear, in an article in "The Fruit-Grower."*
- *Haute cuisine* depends upon the intelligent and lavish use of the best quality materials, but it depends also upon the demand and appreciation of the ordinary man; and how rarely in England do we receive either!—*Margot Swift, in a letter to "Time and Tide."*
- After the war, with free trade in flour restored, real wholemeal bread should be available for those who look to the loaf for essential nourishment, while real white bread is there for those who think they get enough nourishment anyway and like to have their delicate slice as beautifully blanched as a Christmas almond or milady's new-style coiffure.—*The Observer.*

Preserves

The Minister of Food has made an Order, S.R. & O. No. 66 of 1945, amending the Preserves Order, S.R. & O. No. 841 of 1944, which has the effect of permitting sellers to charge reasonable sums by way of deposit for the security and return of outer containers of jam, fruit and mincemeat in the case of first-hand sales by wholesale.

The Order came into force on January 28, 1945.

* * *

Ministry of Food—Fish Division

Mr. F. S. Anderson, J.P., Director of Fish Supplies in the Ministry of Food, is being promoted to be a Principal Assistant Secretary.

In view of the important discussions about to begin with the Fish Trade in regard to future prices, Mr. Anderson will for a few months continue as Director of Fish Supplies as well as undertake the duties of his new appointment. During this period he will be assisted in the Fish Division by Mr. J. A. Peacock, Director of Egg Supplies.

Mr. I. Graul, Assistant Secretary, is being appointed Deputy Director of Fish Supplies.

* * *

Bushel Boxes

The supply position of timber is acute, and in order to effect economy, in the national interest arrangements were made for apples grown in Northern Ireland to be exported to Great Britain in bushel boxes. Large supplies of these boxes are now available for use in the home market, and until these are absorbed into the trade the Ministry will not be in a position to release further supplies of new timber for the manufacture of bushel boxes.

The Northern Ireland bushel boxes (sometimes known as the Z type bushel box) may be purchased by any person engaged in the fruit and vegetable trade, for use in the trade, from any of the Fruit and Vegetable Distribution Committees in Area 2 as defined in the Home Grown Apples (Maximum Prices) Order, 1944. The addresses of the Distribution Committees may be obtained from any of the Ministry of Food Fresh Fruit and Vegetable Area Officers.

Oat Products Order

The Ministry of Food has made an Order entitled the Oat Products (Control and Maximum Prices) Order, S.R. & O., No. 5 of 1945, which came into force on January 28, 1945.

The Order consolidates the Oat Products (Control and Maximum Prices) Order, 1943, the General Licences issued thereunder and two Directions issued under the Food (Transport) Order, 1941.

The Order also includes provisions prohibiting the acquisition of excessive quantities of oatmeal and oat flour for household consumption.

* * *

Fuel Economy Equipment

Towards the end of 1943, the Ministry of Fuel and Power, in reviewing the progress of the Fuel Efficiency Campaign, considered that, notwithstanding the excellent results that had been achieved by improving the efficiency with which fuel was being used in industry, even greater savings were required. To secure these, they decided that some relaxation was necessary in the rigid restrictions which then existed on the manufacture and installation of fuel economy plant.

Agreement was reached with the Ministry of Production, and arrangements were made both to increase the availability of fuel economy equipment and to simplify the procedure for the granting of licences and material allocations required for approved fuel economy schemes.

It was agreed that the Ministry would consider licence applications if the total capital cost of installation would be repaid within a maximum period of two and a half years from the date of licensing, by the value of the fuel that would be saved. During the last twelve months over 2,000 licences have been granted, corresponding in aggregate to an estimated saving of 433,000 tons of fuel per annum.

It is clear that the utmost economies must continue, not only during the present winter, but for some considerable time thereafter. For this reason it has been decided to make the licensing of fuel-saving plant still easier. In future, schemes that will repay the capital expenditure within four years (instead of two and a half years) will be considered.

This means that schemes which have been rejected because they did not conform to the two-and-a-half-year standard can now be reviewed. Applications for licences under the new standard should be made to the Secretary of the Regional Fuel Efficiency Committee at the appropriate Regional Office of the Ministry of Fuel and Power.

* * *

Revocation of Orders

The Minister of Food has made an Order, S.R. & O. No. 60 of 1945, revoking the Wheat Gluten (Licensing of Manufacturers) Order, 1942, the Fish Boxes (Returns) Order, 1943, and the Acquisition of Food (Excessive Quantities) Order, 1942, the need for which no longer exists. The provisions of the Acquisition of Food (Excessive Quantities) Order, 1942, are, however, re-enacted as regards flour and oatmeal by the Flour Order, 1945, and the Oat Products (Control and Maximum Prices) Order, 1945, respectively.

* * *

Changes in Bakeries Division

Following the resignation of Mr. A. Grant Lawson, Director for Bread, the Bread and Flour Confectionery Branches of the Bakeries Division will be combined and Mr. G. Seymour Noon, Director of Cakes and Flour Confectionery, is appointed Director for Bread and Flour Confectionery as from February 1, 1945.

Mr. H. Webster remains Director for Biscuits, and Mr. J. N. Frears Director of Bakeries at the Head of the Division.

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Amendments to Nuts Order

The Minister of Food has made an Order, S.R. & O. No. 100 of 1945, which came into force on January 29, amending the Nuts (Control and Maximum Prices) Order, 1942, and the Dried Fruits (Control and Maximum Prices) Order, 1943, so that it shall be no offence to buy any manufactured product having as an ingredient any nuts or dried fruit. The responsibility of the seller under the existing provisions of those Orders is not affected.

Ministry of Fuel and Power

Major Gwilym Lloyd George, Minister of Fuel and Power, has appointed Professor J. M. Mackintosh, M.D., F.R.C.P., D.P.H., as a member of the Fuel and Power Advisory Council. Professor Mackintosh is Professor of Public Health at the University of London and Dean of the London School of Hygiene and Tropical Medicine; formerly he was Chief Medical Officer of the Department of Health for Scotland and Professor of Public Health at the University of Glasgow.

* * *

Divisional and Local Organisation

Mr. W. J. M. Menzies will be transferred from the North-East Scotland Division to take charge of Emergency Services Division at Headquarters, and as from January 15, Mr. W. Donaldson, who has served as Deputy D.F.O. in North-East Scotland, will succeed him as D.F.O. for that Division.

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Potatoes in Flour Confectionery

As a war-time measure bakers have been encouraged by the Ministry of Food to use potatoes in flour confectionery. The Ministry now suggests that they should not do this for the time being, thus leaving the potatoes for domestic and other urgent needs.

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Mr. A. Grant Lawson

Mr. A. Grant Lawson relinquished his appointment as director for Bread in the Ministry of Food on January 31, 1945.

The Minister has accepted his resignation with regret, and wishes to place on record his appreciation of Mr. Grant Lawson's services to the Ministry.

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Imports of Honey

As from March 1 next, the Ministry of Food will cease to be the sole importer of honey. On and after that date applications for import licences will be considered from traders who were importing honey during the twelve months' period ending August 31, 1939.

Overseas Items

U.S. Fats and Oils

The strong European demand for fats and oils to be supplied by the U.S. in 1945 parallels a similar demand in 1919, when exports of leading fats and oils rose to over 1,000,000,000 lb., approximately 40 per cent. more than the 1910-14 average. The quantity of fats and oils exported to Europe remained above the pre-war level for several years after 1919. Exports of U.S. lard and soya beans are likely to be fairly large for several years after 1945, but only if prices are permitted to adjust to international levels.

* * *

Goods for Liberated Countries

An increase of supplies to liberated areas, particularly to France, is expected as a result of the conversations concluded recently between Mr. Richard Law, British Minister of State, and American authorities on Allied shipping problems.

It is authoritatively stated that the shipping situation is still extremely tight, but the programme agreed on will allow of some expansion. As a result of the conversations the Allies will "squeeze out" a number of ships to supply liberated areas.

The new programme will not give the countries everything they need, want, or should have, because of immediate military necessities. It is pointed out in Washington that the problem is not one of relief, but a question of preventing widespread unemployment in liberated areas as a result of factories not having raw materials. Once French factories reach full production they will be able to make goods which would otherwise have to be shipped, and this will help to solve the shipping difficulties. There is no change in the allocation of ships for the exchange of goods with Latin America.

The view has been expressed that a proportion of Allied shipping was being used to exchange between the United States and Latin America commodities such as coffee and sugar not vital to the war effort.—*Reuter.*

Chilean Meat-Freezing Industry

Meat-freezing now ranks as the second most important industry in the Province of Magallanes, Chile, following that of sheep-farming. This industry dates back to 1895.

The five freezers in the province buy sheep on the hoof from the farmers, transport them to the freezers, slaughter, freeze and ship them to the north of Chile or to foreign countries.

All the freezers have facilities to slaughter approximately 5,000 sheep a day, with the exception of Tres Puentos, which can dispose of 2,500 animals a day.

* * *

Scientists Plan Locust War

The planning of new campaigns to defeat the locust, age-long enemy of the Middle East, is being carried on in Cairo by a brilliant scientific general staff here to-day.

To meet the threat of a locust invasion during the forthcoming spring and summer—an invasion threatening the production of urgently needed food—technical representatives of nine Middle East countries and of India, Turkey, Russia, and Britain are planning the strategy to be employed in destroying this vicious enemy before he has time to attack.

A leading member of the anti-locust general staff is the Russian scientist Dr. B. P. Uvarov, now a naturalised Englishman. He possibly knows more about locusts than anyone else in the world. He has been technical head of the Anti-Locust Research Centre in London since 1942, and his contribution to the plans should be one of the most important features of the conference.

The Cairo conference is part of international anti-locust work carried on for almost two decades. Over forty different countries keep the London Research Centre informed of locust movements and breeding.

Invasion courses are studied and forecast and all possible steps taken to destroy the swarms before they start their land-withering journeyings.—*Reuter.*

World Farmers' Conference

Primary producers throughout New Zealand readily endorse the suggestion for a London conference of farmers' organisations as a step towards creating an international federation of primary producers.

The suggestion was made by Mr. James Turner, leader of the delegation of British farmers who recently visited New Zealand, and were welcomed by a conference of farming organisations in Wellington. Mr. Turner said an international organisation would promote collaboration in the production and marketing of foodstuffs.

Mr. W. W. Mulholland, President of the New Zealand Farmers' Union, said the possibility of an international organisation of farmers was still a dream, but was an essential forerunner of action. From what he had seen of the calibre of the British delegation he knew they would not stop at the dream.—*Reuter.*

* * *

Swedish Scientific Research

The agricultural University of Ultuna will shortly have a special institute for technical research in Swedish agriculture. This institute is to intensify agricultural research and to compile information concerning agricultural mechanisation, which is at present carried out by both private, industrial, and State organisations. The institute will be similarly organised to the various industrial research institutes and is to be financed by both State grants and contributions from various agricultural and industrial organisations.

At the beginning of the war Sweden was the most advanced European country in matters of agricultural mechanisation. If conditions in Swedish agriculture at the present day are compared with those of twenty-five years ago, a very considerable development is apparent. In 1920 there were only about 1,000 tractors, in 1930 about 6,000, while in 1940 there were no less than 24,000. Among other things, it is hoped

to make possible an increase in the general utilisation of machines for the small farm, to establish mechanised centres, and to modernise transport etceteras. Much also has to be done in the way of improving the breeding of cattle and the indoor work of the farms.

By thorough experimental tests a development of machines, tools, and working methods can be made possible which will be in full conformity with future needs. It will also be necessary to increase the collaboration between the industry and the economic and technical experts.—*Reuter's Trade Service.*

* * *

Dehydration of Food in South Africa

The dehydration of food developed in South Africa during the war has good prospects of becoming a permanent peace-time industry, according to Dr. G. M. Dreosti, the Government officer in charge of dehydration.

New factories, machines and new dehydrated products are continually being put into production in South Africa. Plants already operating concentrate mainly on milk, eggs, vegetables and fruit—*Reuter.*

* * *

Australia Controls Wheat Consumption

Mr. Scully, Commonwealth Minister of Commerce and Agriculture, announces that owing to crop failure wheat consumption will be controlled under a quota system administered by the Australian Wheat Board.

New South Wales and Victorian millers are receiving sufficient wheat to maintain operations on a two-shift basis for the time being. Breakfast food manufacturers will be allotted 3,750,000 bushels, largely to enable them to supply Services requirements. In addition, because of the serious effect of the drought on livestock, 46 million bushels of wheat are to be allotted to stockfeeders.

Mr. Scully says there is enough wheat in Australia to supply all normal needs and to partly replace other grains and fodder now in short supply. Although the Government has decided that it is not desirable that there should be any shortage of wheat for essential purposes, a check must be kept, as Australia is under an obligation to supply the United Nations with as much wheat and flour as can possibly be spared.—*Reuter.*

* * *

New Swedish Agricultural Machine

A new machine for the harvesting of sugar beets has been in operation for two years under the observation of a special committee of experts, appointed by the sugar combine, and has been found to be very successful. It is a combined machine which in pulling up the beets cleans them from earth and transports them by a sort of elevator into the carriages.

One hectare of beets can, with this machine, be harvested in about 70 working hours, whereas previously 180 working hours were required.

* * *

Empire Farmers' Conference for London

The conference of British farmers and representative New Zealand primary producers recommended that delegates should be sent to a conference of primary producers' organisations in London in October next.

It was agreed that, in addition to Empire delegates, the United States should also be invited to send representatives to the London conference.

The hope was expressed that an international federation of primary producers' organisations would be established.—*Reuter.*

* * *

World Agricultural Production

The United States Office of Foreign Agricultural Relations reports that, despite shortages of fertilisers, equipment and manpower, agricultural production over the world as a whole has increased slightly during the war years. A survey of output in thirty countries, having 60 per cent. of the world's population, showed a rise in 1942 and 1943 of 7 per cent. on pre-war levels, measured in calories. The estimated scale of expansion was about 30 per cent. in North America, 17 per cent. in South America, 3 per cent. in Southern and Eastern Asia, and 1 per cent. in Oceania and South Africa. Production fell by 5 per cent., it is calculated, in Western Europe and North Africa, and by 5 per cent. in the Middle East.

While no estimates were available for the battle areas of Russia, China, Malaya and the East Indies, it is thought that production in those areas has declined considerably. The world increase, in fact, was probably no greater than the increase in population that it had to meet.

* * *

Meat Plants for Brazil and Uruguay

M. T. Zarotschenzeff, President of National Frosted Foods, Inc., New York, recently completed a four-month trip through Brazil and Uruguay, during which he inspected meat and other food plants and lectured on refrigeration, quick freezing, and meat sterilisation by dielectric heating. Besides showing American dehydrated products, Mr. Zarotschenzeff demonstrated Brazilian meat and other foods quick frozen and Cellophane-wrapped at various places.

Mr. Zarotschenzeff presented the Governments of Brazil and Uruguay with programmes for development of refrigeration and dehydration in the two countries. His plan for Brazil included construction of 7 cold-storage plants, 20 fish and 20 poultry plants, 150 refrigerated railroad cars equipped with diesel engines and refrigerating units instead of the customary ice, 40 locker plants, 100 cargo planes for distribution in the interior, 100 refrigerated trucks, 10 large refrigerated ships for overseas shipments, and 20 small refrigerated boats for local distribution, and hundreds of display cases for food stores and institutions. Of greatest importance is the installation of refrigerators in private homes. The project would cost about $30,000,000.

His plan for Uruguay is similar to that for Brazil, except that it is on a smaller scale. It would call for construction of an entirely new Frigorifico Nacional del Uruguay to take the place of the forty-year-old packing plant now being used. The new *frigorifico* would cost approximately $6,000,000.

Information and Advice

Maize Flour and Maize Starch

9,381. A correspondent sends the following description of maize flour and maize starch, which amends that given in the November issue of FOOD MANUFACTURE :

" Maize flour " is the flour obtained by milling the endosperm of the maize berry, and is called " corn flour " in the U.S.A. The approximate analysis of maize flour is : Starch, 78 per cent. ; moisture, 12 per cent. ; protein, 7 per cent. ; crude fibre, oil and ash, 3 per cent.

" Maize starch " in this country is the starch separated from the maize berry and has the approximate composition : Starch, 83·85 to 87·3 per cent. ; moisture, 12 to 15 per cent. ; protein, 0·1 to 0·3 per cent. ; ash, 0·1 to 0·2 per cent. ; fat, 0·5 to 0·75 per cent. When used for edible purposes maize starch is called " cornflour " in this country. In the U.S.A. maize starch is called " corn starch."

Fat Determination in Foods

9,648. *Required details of Von Liebermann's method for fat determination in feeding stuffs, flesh, etc.* (Yorks.)

The method was published in *J.S.C.I.*, 1899, page 79, headed " Fat in Feeding Stuffs, Flesh, etc. A New Method of Determining." L. Liebermann and S. Szekely. *Arch. Physiol.*, 1898, **72**, 360 (through *Chem. Zeit Rep.*, 1898, **22**, 95, 288-289).

Five grms. of the substance are boiled for 30 minutes with 30 c.c. of a 50 per cent. solution of potassium hydroxide (sp. gr. 1·54) in a flask of the following description : The body is 7·5 cm. in diameter and 5·5 cm. deep, and has a flat bottom. The neck is 19·5 cm. long and 3·5 cm. in diameter throughout its length. When filled to about the middle of the neck the flask holds about 290 c.c., and has a mark at 240 c.c.

After the boiling, the contents of the flask are cooled, mixed with 30 c.c. of 90 to 94 per cent. alcohol and again heated for about ten minutes. When cold, 100 c.c. of 20 per cent. sulphuric acid (sp. gr. 1·145) are cautiously added with constant shaking, and continual cooling in order to avoid a possible loss of volatile fatty acids. The liquid, which finally contains an excess of about 4·4 grms. of sulphuric acid, is mixed with 50 c.c. of petroleum spirit (sp. gr. 0·6 to 0·7, and boiling point about 60° C.), and the flask closed with a rubber cork and shaken about 30 times at intervals of one or two minutes. A saturated solution of sodium chloride is then added, so that the flask is filled to about the middle of the neck, whilst the aqueous layer below the petroleum spirit stands at the mark (240 c.c.). After again being shaken once or twice, the closed flask is placed in a vessel of water and allowed to stand at not too high a temperature. As soon as the petroleum layer (which now contains the entire fatty acids in solution) has separated, 20 c.c. are pipetted off into a wide-necked flask of about 150 c.c. capacity, mixed with 40 c.c. of neutral 96 per cent. alcohol, and titrated with decinormal alcoholic potash. The titrated liquid is then transferred into a weighed glass basin, holding about 80 c.c., and provided with a ground-glass cover, where it is cautiously evaporated to dryness on the water-bath at a low temperature, and finally dried at 100° C. for an hour and weighed.

In order to calculate the amount of fat, the amount of potassium in the soap must be deducted, and the equivalent amount of glycerin radicle added. 1 c.c. of decinormal potash = 0·00391 grm. of potassium and 0·00136 grm. of C_3H_5, so that one must subtract as many times 0·00255 grm. as the number of c.c. of alkali used in the titration. The quantity of fat in the substance can thus be calculated by the formula—

$$F = \left[\frac{S - 0{\cdot}01 - (k \times 0{\cdot}00255)}{a}\right] 250$$

in which F is the percentage of fat in the substance; S, the weight of potassium soap from 20 c.c. of the petroleum spirit; k, the number of c.c. of decinormal potash; and a, the weight of the substance under examination.

This method is said to give good results in the examination of oil-cakes, flesh, fæces, etc. ; and with slight modifications with such substances as hay, flour, etc.

Information Supplied

9,686. *Name and address of a firm supplying a tomato juice extractor, also of a firm who will import tomato juice and orange juice in bulk after the war.* (Lancs.)

9,696. *Information regarding ice cream powder—cold mix.* (Lancs.)

9,698. *Information regarding ice cream powder—cold mix.* (Lancs.)

9,701. *Information regarding ice cream powder—cold mix.* (London.)

9,706. *Information regarding the manufacture of passion fruit juice.* (S. Africa.)

9,709. *Names of suppliers of hasher knives and plates for the Enterprise mincing machine.* (Lancs.)

9,731. *Names of suppliers of plant for vacuum packing in tin boxes of biscuits.* (Essex.)

9,732. *Names of suppliers of waxed tissues.* (London.)

9,744. *Names of suppliers of machine which will place metal clip lids on to 1-lb. jam jars.* (Yorks.)

9,745. *Information regarding the manufacture of suet pellets.* (Scotland.)

9,746. *Information regarding the re-tinning of dough-mixers.* (Beds.)

9,747. *Names of suppliers of apple-corers and apple-peelers.* (Yorks.)

9,750. *Address of the Ice Cream Alliance, Ltd.* (Lancs.)

9,752. *Names of suppliers of presses for baling empty tins.* (Staffs.)

9,758. *Names of suppliers of machinery and apparatus for table jelly making.* (Warwickshire.)

9,759. *Name of manufacturers of potato crisps.* (N. Ireland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in or relating to Plant for Making Pies or Baked Food Products in large Quantities

A plant for making large quantities of pies or other baked food products is provided with one or more dough dividers, a machine for forming the dough into cups in tins, mechanical means for supplying the contents to the cups, with or without mechanical means for cutting dough into covers and for applying the covers to the filled cups, mechanical means for transferring the filled cups in their tins in alignment to an endless steel, wire or other suitable band conveyor passing through an oven, which may or may not be preceded by a prover, and through a cooler, whilst mechanical means may also be provided for removing the products from the tins and transferring them to a conveyor passing through a final cooler. The passage through the final cooler is preferably effected in the case of pies after these have been jellied and in the case of other products after these have for example been washed or subjected to other treatment, such as washed with water or egg-white, coated with cream or enrobed.

The plant may also include mechanical means for returning the tins, after the baked products have been removed therefrom, to the machine or machines in which the dough is formed into cups therein.

When the plant is used for making food products provided with covers, mechanical means are preferably provided for cutting dough into covers and for applying these covers to the filled cups.

Preferably a number of machines are provided for forming cups in tins, filling the cups, and for forming and applying covers to the filled tins when required, these machines being so grouped relatively to the conveyor passing through the oven that the filled cups are supplied to this conveyor in a substantially continuous flow.

When filled cups are to be supplied to the oven conveyor from a number of machines the filled cups are preferably aligned mechanically transversely to the conveyor in separate groups from their respective machines, whereupon the separate groups are aligned mechanically transversely to the conveyor before passing into the oven or the prover when a prover is provided.

The separate filling machines preferably deliver on to separate feed conveyors of which the ends adjacent the machines are staggered, whilst the ends of the separate feed conveyors nearest the oven conveyor are in alignment.

When making meat pies, the pies, after being removed from their tins, are preferably brought into alignment automatically and are preferably passed in aligned groups through a machine for supplying them automatically with jelly or for washing or otherwise treating them, whereupon the pies are passed automatically in alignment through the final cooler.

After passing through the final cooler the baked products are passed through automatic wrapping mechanism, or are hand wrapped, and then conveyed to packing stations.

561,764. *Pelkman Bros., Limited, and Johannes Hermanus Nieulant Pelkman.*

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

564,285. TECALEMIT, LTD., and LE CLAIR, C. C. S.: Oil or other liquid filters or cleaners.

564,371. HOSKING, H. G. W.: Method of and means for proofing cartons or containers against moisture.

564,374. HORGAN, G. D., and GAMBLE, H.: Blank feeds for packeting machines.

564,377. FREDHOLM, A. H.: Method for the production of dried potatoes.

564,381. HERMANN, R.: Heaters for liquids.

564,402. BERK AND CO., LTD., F. W., and SLACKE, R. L. R.: Grinding mills.

564,405. EMERSON, E.: Metal crates and trays used for carrying bottles.

564,406. EASYCANTOP, LTD., and WALENSKY, B.: Device for feeding can lids and the like from a stack.

564,438. EVERTAUT, LTD., and BRADBURY, A. A.: Storage racks.

564,543. HARBER, L. S., and BAKER PERKINS, LTD.: Manufacturers of tin bread.

564,567. NICHOLLS, E. J.: Tea crushing and rolling machines.

564,599. VOKES, C. G.: Air filtration.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

SUN.—622,322. Cereals (prepared for human consumption), and flour. **Sun Flour Mills Co., Ltd.,** Bankside House, Leadenhall Street, London, E.C. 3; Millers.

ALMOLURE.—629,762. Flavourings for food (other than essential oils). **The Scottish Flavour and Colour Co., Ltd.,** Mayfield Works, 27 to 29, Ratcliffe Terrace, Edinburgh; Manufacturers and Merchants.

SOYATEIN.—B629,800. Preparations of soya flour for use as food or as ingredients in food. **Wilfred Leslie Goodfellows,** 8, Barcheston Road, Cheadle, County of Chester; Manufacturer.

New Companies

Lovel-Lewis, Limited. (389796.) Dens Farm, Wadhurst, Sussex. To carry on bus. of farmers, produce merchants, etc., carried on by Frank L. Lewis at Long's Farm and Doozes Farm, and elsewhere in Sussex. Nom. cap.: £10,000 in £1 shares. Dirs.: F. L. Lewis, Mrs. B. B. L. Lewis and Mrs. I. M. Beloe, all of Dens Farm, Wadhurst, Sussex.

Williamson and Treadgold, Limited. (389827.) The Office of Howard Willis and Parsons, 9-14, Exchange Buildings, Upper Hinton Road, Bournemouth. To take over bus. of grocers, fruiterers and florists carried on at Bournemouth and Fawley, as "Williamson and Treadgold." Nom. cap.: £40,000 in £1 shares. Dirs.: J. R. Treadgold, Birklands, Dunbar Road, Bournemouth; M. Lusby, 13, Widdicombe Avenue, Parkstone; G. M. Pitman, 3, Lonsdale Road, Bournemouth.

Associated Fish Traders (Grimsby), Limited. (389813.) Fish Dock Road, Fish Docks, Grimsby. Nom. cap.: £100,000 in £1 shares. Dirs.: W. W. Smethurst, Thornton Hall, Lincs; J. C. Ross, 30, Abbey Park Road, Grimsby; L. Kemp, Sunnyside, Tetney, Lincs; T. Ross, 40, Park Avenue, Grimsby; A. E. Kelham, 170, Scartho Road, Grimsby; G. T. Baker, Sunnyside, Queen's Parade, Cleethorpes; J. A. Sutherland, 3, Cromwell Road, Cleethorpes.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.